

حمل الآن

مجاناً وحصرياً

المراجعة رقم (1)

اختبار شهر ابريل



Questions ?

Unit Three | Lesson 4

Answered

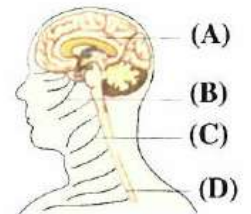
First Multiple Choice Questions

Questions signed by * are answered in detail.

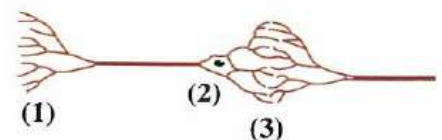


Interactive
test

Nervous system



- 1 From the opposite figure, what are the parts that represent the central nervous system?
 - (a) (A) and (C).
 - (b) (B) and (C).
 - (c) (A) and (D).
 - (d) (C) and (D).
- 2 Which of the following choices is applied to the peripheral and central nervous systems?
 - (a) The peripheral system is a part of the central system.
 - (b) The central system is a part of the peripheral system.
 - (c) The peripheral system joins the central system by the other organs.
 - (d) The central system joins the peripheral system by the other organs.
- 3 Which of the following accurately expresses the function performed by the nervous system?
 - (a) Recognizing the external environment stimuli and transmitting them to the internal environment.
 - (b) Converting electrical stimuli into chemical signals.
 - (c) Responding to stimuli voluntarily only.
 - (d) Processing stimuli and transmitting them to generate responses.
- 4 * What is the part of the nerve cell which transmits the nerve signals away from the cell body?
 - (a) Cytoplasm.
 - (b) Dendrite.
 - (c) Axon.
 - (d) Nucleus.
- 5 Which of the following can be linked by sensory neurons?
 - (a) The brain and muscles.
 - (b) The sense organs and muscles.
 - (c) A sense organ and another sense organ.
 - (d) The sense organs and brain.
- 6 Which of the following represents the route of transmitting the nerve signals from a nerve cell to another?
 - (a) Dendrites → Nerve endings.
 - (b) Dendrites → Dendrites.
 - (c) Nerve endings → Nerve endings.
 - (d) Nerve endings → Dendrites.
- 7 The opposite figure represents the connection between two nerve cells, where the two parts (1) and (2) are found in the central nervous system. What is the direction of the nerve signal?
 - (a) (1) → (2) → (3) → Motor nerve cell.
 - (b) (3) → (2) → (1) → Motor nerve cell.
 - (c) (1) → (2) → (3) → Sensory nerve cell.
 - (d) Sensory nerve cell → (1) → (2) → (3).



- 8 What are the cells that transmit the nerve signals from the skin to the central nervous system?
 (a) Sensory neurons. (b) Motor neurons. (c) Interneurons. (d) Neuroglia.
- 9 Which of the following choices represents the connection between the nerve cells' parts inside the central nervous system?

	Nerve endings of cells	Dendrites of cells
(a)	Motor	Interneurons
(b)	Interneurons	Motor
(c)	Motor	Sensory
(d)	Interneurons	Sensory

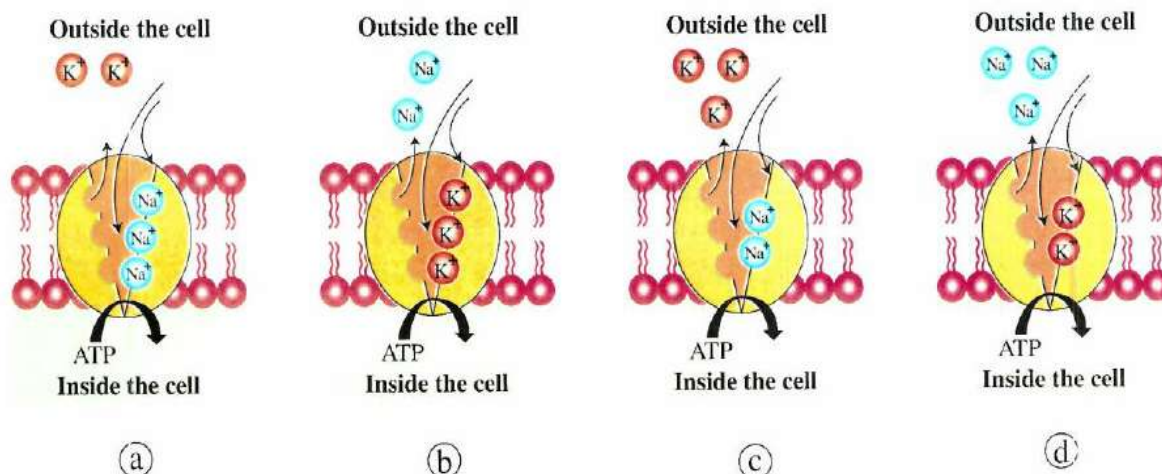
— The membrane potential and the nerve impulse transmission

- 10 What explains the importance of the resting potential in the nerve cell?
 (a) It prevents the cell's response.
 (b) It keeps the membrane ready to transmit the impulse when a stimulus occurs.
 (c) It increases the permeability of proteins to outside.
 (d) It increases the membrane's permeability to the entry of sodium ions.

- 11 According to the values of the ions illustrated in the opposite table, what is the state of this cell?
 (a) Rest state.
 (b) The end of the depolarization state.
 (c) The beginning of repolarization state.
 (d) Hyperpolarization state.

	Inside the nerve cell membrane	Outside the nerve cell membrane
Na^+	15 mM	145 mM
K^+	150 mM	5 mM

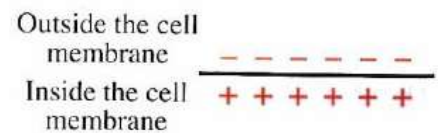
- 12 Which of the following figures represents the action of sodium-potassium pump?



- 13 * Which of the following is related to the nerve cell membrane potential at repolarization?
- The inflow of sodium ions to the cell is higher.
 - The outflow of potassium ions from the cell is higher.
 - The equal distribution of ions.
 - The action of sodium-potassium pump stops.

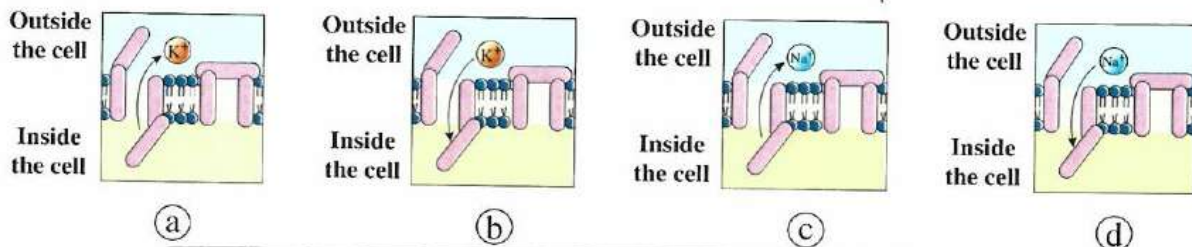
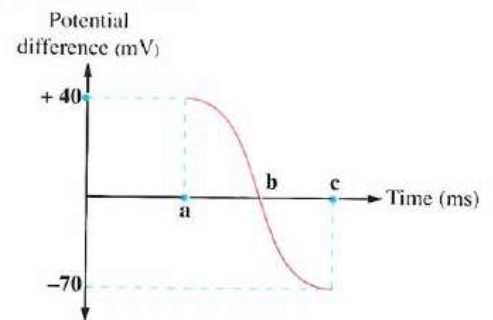
- 14 What is the occurred change to the nerve cell membrane potential at depolarization?
- It remains constant at -70 mV
 - It becomes more negative.
 - It changes from negative to positive.
 - It doesn't change.

- 15 * Which of the following doesn't agree with the opposite diagram of the nerve cell membrane?

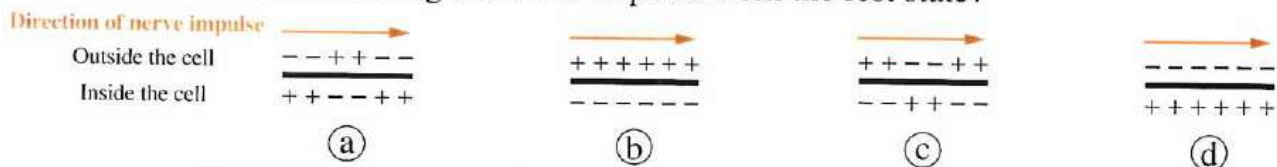


- The membrane is at depolarization state.
- The concentration of sodium ions inside is higher than outside.
- The potential difference on the two sides of the membrane equals -70 mV
- The nerve cell will need ATP to return to the polarization state.

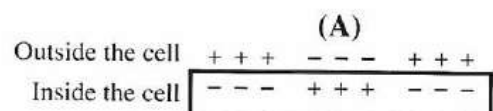
- 16 Which of the following figures represents the flow of a large amount of ions during the period (ab) of the nerve impulse in the opposite curve?



- 17 Which of the following figures the shaded part in it represents the state of nerve cell membrane when transmitting the nerve impulse from the rest state?

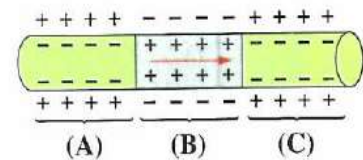


- 18 From the following figure, which of the following agrees with the change occurred in the nerve cell membrane state in region (A)?



- Inflow of large amount of (K^+) .
- Inflow of large amount of (Na^+) .
- Changing the potential difference to -70 mV
- Repolarization.

19 From the opposite figure:



(1) What are the states of the nerve cell membrane at the two regions (B) and (C) respectively?

- (a) Polarization / Depolarization. (b) Repolarization / Depolarization.
(c) Depolarization / Polarization. (d) Depolarization / Repolarization.

(2) * What happens to the sodium and potassium channels respectively to reach the state at region (A)?

- (a) Closes / Opens. (b) Opens / Closes.
(c) Opens / Opens. (d) Closes / Closes.

20 Which of the following causes the change in the potential difference on the two sides of the nerve cell membrane after stimulation to reach (+40 mV)?

- (a) The inflow of (Na^+). (b) The inflow of (K^+).
(c) The inflow of (K^+) and the outflow of (Na^+).
(d) The outflow of (K^+) and (Na^+).

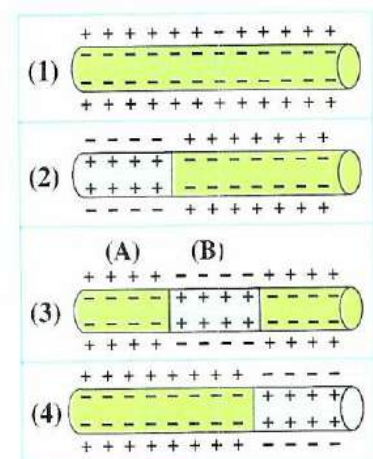
21 The following figure illustrates the membrane of nerve cell during different stages:

(1) Which of these stages represents the nerve cell at rest state?

- (a) (1). (b) (2).
(c) (3). (d) (4).

(2) In stage (3), what is the value of the electrical potential difference in millivolt between the two sides of the nerve cell membrane in the two regions (A) and (B) respectively?

- (a) -70 / +40 (b) +40 / +40
(c) +40 / -70 (d) -70 / -70



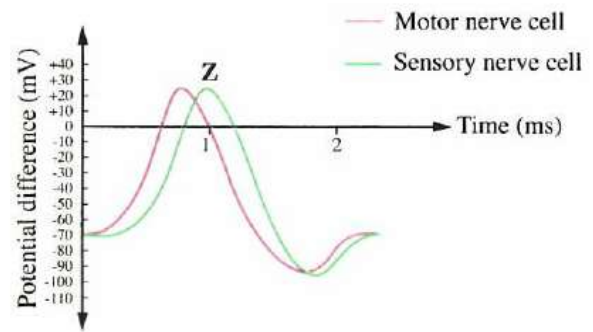
22 Upon repolarization, the occurs.

- (a) inflow of sodium ions to the cell
(b) outflow of potassium ions from the cell
(c) stopping of sodium-potassium pump
(d) increase in positive potential inside the cell

23 The period during which a new nerve impulse **cannot** be generated is called

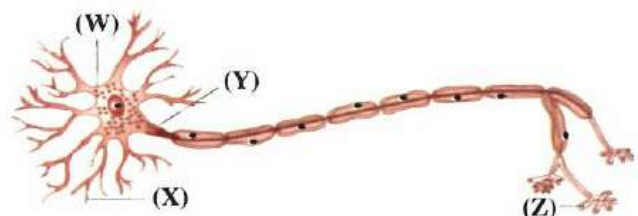
- (a) depolarization (b) repolarization
(c) refractory period (d) resting potential

- 24 The opposite graph represents the potential difference across the membrane of two nerve cells, one of them is sensory and the other is motor in the same living organism, and each of them is at stimulation state:



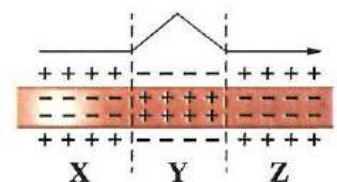
- (1) Which of the following statements is correct at time (0)?
- The motor nerve cell only is at rest state.
 - The sensory nerve cell only is at polarization state.
 - Both cells are at rest state.
 - The sensory nerve cell is at repolarization state.
- (2) Which of the following is the reason for the change in the potential difference of the sensory nerve cell membrane at time period (0 : 1)?
- The inflow of (Na^+).
 - The inflow of (K^+).
 - The outflow of (Cl^-).
 - The outflow of (K^+) and (Cl^-).
- (3) What happens at point (Z)?
- The channels of sodium and potassium are opened.
 - The channels of sodium and potassium are closed.
 - The channels of sodium are opened and the channels of potassium are closed.
 - The channels of potassium are opened and the channels of sodium are closed.

- 25 In the opposite figure, when stimulating this nerve cell at point (Y), through which of the following points the nerve impulse transmits to the adjacent nerve cell?



- (W).
- (X).
- (Y).
- (Z).

- 26 The opposite figure shows the transmission of the nerve impulse, study the following statements, then answer:

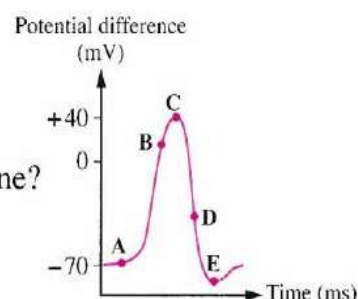


- The electrical change occurs in part (X), due to the inflow of (Na^+) by diffusion.
- The maximum potential difference in part (Y) is + 40 mV
- Part (Z) is in a polarization state and the ions concentration on the two sides of the membrane is equal.

Which of the previous statements is correct?

- (1) and (2).
- (2) only.
- (3) only.
- (1) and (3).

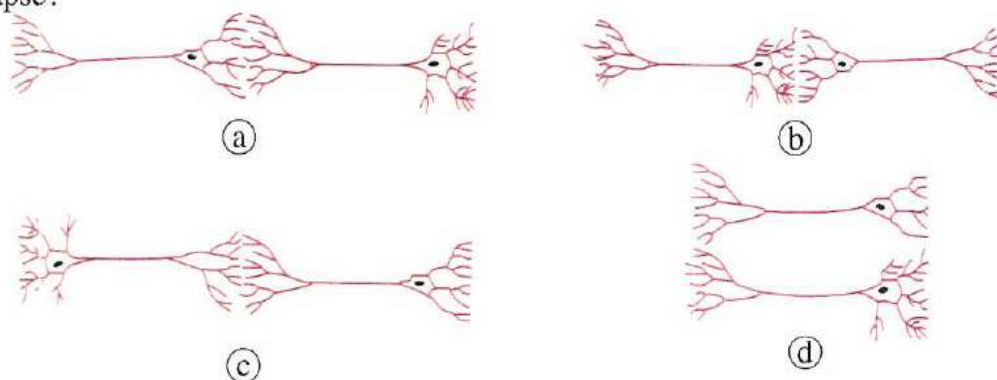
- 27 The opposite graph shows the stages through which the neuron passes during stimulation:



- (1) * At which point the sodium ions concentration reaches the maximum value on the inner side of nerve cell membrane?
- (a) A (b) B
(c) C (d) D
- (2) At which point the potassium ions concentration reaches the maximum value on the outer surface of nerve cell membrane?
- (a) A (b) B (c) D (d) E
- 28 * What are ATP molecules used for after the transmission of nerve impulse through the nerve cell?
- (a) The inflow of Na^+ only. (b) The inflow of K^+ only.
(c) The inflow of Na^+ and the outflow of K^+ (d) The inflow of K^+ and the outflow of Na^+
- 29 * Which of the following whose absence affects the return of the nerve cell membrane to the rest state?
- (a) Synapse. (b) Mitochondria. (c) Nerve endings. (d) Dendrites.
- 30 * Which of the following phenomena takes place when the potential difference reaches (-80 mV) across the two sides of the nerve cell membrane?
- (a) Depolarization. (b) Hyperpolarization.
(c) Repolarization. (d) Potential difference in rest state.

— Synapse

- 31 Which of the following figures represents the connection between two neurons through the synapse?



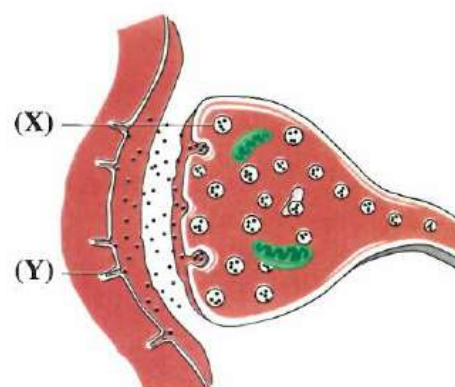
- 32 The Purkinje cell which can receive hundreds of thousands of synapses shows that
- (a) the nervous system has slow response
(b) neurons operate independently
(c) the nervous system is an interconnected network that transmits information quickly and accurately
(d) there are few synapses in the brain

- 33 Receiving signals among Purkinje cells is characterized by
- 200000 responses result from a single synapse
 - one response results from 200000 synapses
 - one response results from a single synapse
 - 200000 responses result from 200000 synapses

- 34 What is the main function of neurotransmitters in the synapse?
- Signal transmission on the two sides of the membrane.
 - Signal transmission between two cells.
 - Signal transmission from the cell body to the axon.
 - Signal transmission across the axon.

- 35 From the opposite figure:

- (1) Which of the following statements **doesn't** agree with structure (X)?
- It is affected by calcium ions.
 - Its content is affected by cholinesterase enzyme.
 - It contains neurotransmitters.
 - It is found in the cell bodies of neurons.

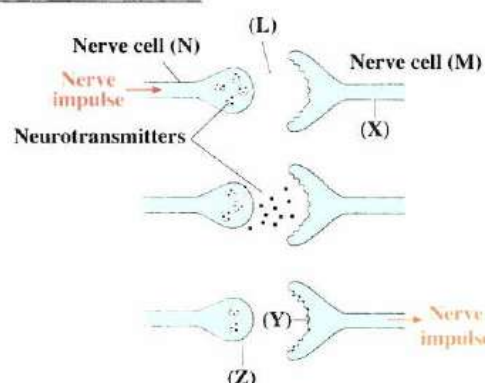


- (2) What does structure (Y) represent?
- A channel for the passage of sodium ions.
 - A pump for the passage of calcium ions.
 - A channel for the passage of sodium and calcium ions.
 - A channel for the passage of potassium and calcium ions.

- 36 Which of the following **doesn't** agree with the functions of nerve cells in human?
- The transmission of the neural stimulations.
 - The transmission of the nerve impulse from the sense organs to the central nervous system.
 - The transmission of the nerve impulse from the central nervous system to the response organs.
 - The transmission of the neurotransmitters from the presynaptic membrane to the sensory receptors.

- 37 The opposite figure represents the transmission of nerve impulse through the synapses:

- (1) What is the structure where the calcium pumps are present?
- (X).
 - (Y).
 - (Z).
 - (L).



(2) What is the structure where the receptors of the neurotransmitters exist?

- (a) (X). (b) (Y). (c) (Z). (d) (L).

(3) What is(are) the structure(s) that extend(s) from the cell body of the nerve cell?

- (a) (X). (b) (Y). (c) (Y) & (Z). (d) (X) & (Z).

38 What happens when binding the acetylcholine compounds with their specific receptors on the membranes of dendrites?

- (a) The inflow of (Na^+) to the postsynaptic membrane.
 (b) The inflow of (Na^+) to the presynaptic membrane.
 (c) The inflow of (Ca^{2+}) to the postsynaptic membrane.
 (d) The inflow of (K^+) to the presynaptic membrane.

39 What is the substance that enters the presynaptic membrane of the nerve cell and what is the substance that leaves it during the nerve impulse transmission?

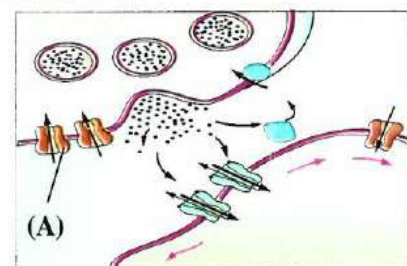
	The substance that enters the presynaptic membrane	The substance that leaves the presynaptic membrane
(a)	Neurotransmitter	Calcium ions (Ca^{2+})
(b)	Calcium ions (Ca^{2+})	Sodium ions (Na^+)
(c)	Sodium ions (Na^+)	Neurotransmitter
(d)	Calcium ions (Ca^{2+})	Neurotransmitter

40 Which of the following statements isn't correct about the synapse?

- (a) The neurotransmitters affect the postsynaptic membrane.
 (b) The synaptic cleft separates between the cells of the synapse.
 (c) It includes two neurons.
 (d) The neurotransmitters are secreted from the dendrites.

41 In the opposite figure, what is the role of structure (A)?

- (a) Releasing the acetylcholine to the synaptic cleft.
 (b) Starting the stimulation of the postsynaptic membrane.
 (c) Ending the role of neurotransmitters in stimulating the postsynaptic membrane.
 (d) The entry of calcium ions to the presynaptic membrane.



42 Which of the following is caused by acetylcholine?

- (a) The formation of the potential difference of the nerve cell at rest state.
 (b) The transmission of nerve impulse through the synaptic regions.
 (c) The increase of the nerve cell polarization.
 (d) Increasing the permeability of the postsynaptic membrane for each of (Na^+) and (K^+) to outside the cell.

- 43 The people who suffer from a deficiency in parathormone hormone have low level of calcium ions in blood. What is the effect of that on the nerve impulses transmission in the synapse?
- (a) Breaking down of acetylcholine in the vesicles.
 - (b) Decreasing in the amount of acetylcholine in the vesicles.
 - (c) Delaying the release of acetylcholine.
 - (d) Changing the shape of acetylcholine receptors.
- 44 Which of the following isn't a purpose for the Nerve Conduction Velocity (NCV) test?
- (a) Assessing the nerve damage.
 - (b) Detecting the nerve-related disorders.
 - (c) Determining the extent and location of nerve injuries or deformities.
 - (d) Increasing the rate of impulse speed in nerves.

Second

Miscellaneous Questions

1 Write the scientific term for each of the following statements:

- (a) The main building unit of the nervous system.
- (b) The potential difference across the nerve cell membrane when being equal to -70 mV
- (c) The state of the nerve cell membrane when the outer surface of the cellular membrane is positive and the inner surface is negative.
- (d) Impulses that are transmitted along the nerve cell from the depolarization, then repolarization, then depolarization, and so on.
- (e) A short period after each nerve impulse, where the cell doesn't respond to a new stimulus during it.
- (f) The region of connection between the axon terminal of one nerve cell with the next nerve cell body.
- (g) A swelling at the axon terminal of the cell transmitting the nerve signal.
- (h) A tiny gap between two adjacent nerve cells.

2 Give reasons for:

- (a) Signals that are received by senses pass through the nervous system.
- (b) The nerve cell is polarized at rest state.
- (c) The nerve cell repolarization after the closure of sodium channels.
- (d) The propagation of the nerve impulse in the form of pulses of depolarization, repolarization and depolarization again.
- (e) The nerve impulse ability to be transmitted across the synaptic cleft.

3 What happens in each of the following cases:

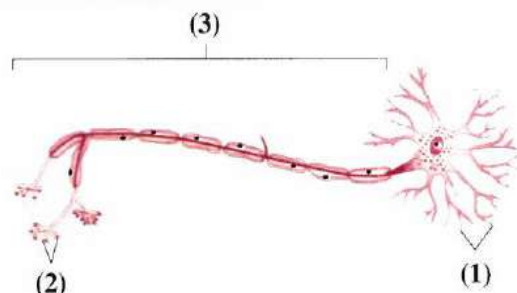
- (a) The absence of the communication between the nervous system and senses.
- (b) The rapid inflow rate of sodium ions (Na^+) into the nerve cell.
- (c) The state of the nerve cell membrane is unchanged during the refractory period.
- (d) The arrival of a strong stimulus to a nerve cell within less than 0.001 seconds after nerve stimulation.
- (e) The disappearance of the synaptic vesicles from the synaptic knob.
- (f) The stimulation or excitation of a nerve cell by another adjacent nerve cell.

4 Compare between each of the following:

- (a) Sensory neurons and motor neurons "**in terms of: Function**".
- (b) Polarization state and depolarization state of the nerve cell membrane
"**in terms of: Time of occurrence – The charges on the membrane sides – The potential difference between the membrane sides**".
- (c) Presynaptic and postsynaptic membranes "**in terms of: The structures found in it and their roles in the nerve impulse transmission**".
- (d) Calcium channels and sodium-potassium pump in the nervous tissue
"**in terms of: Function – The effect of their action**".

5 In the opposite figure:

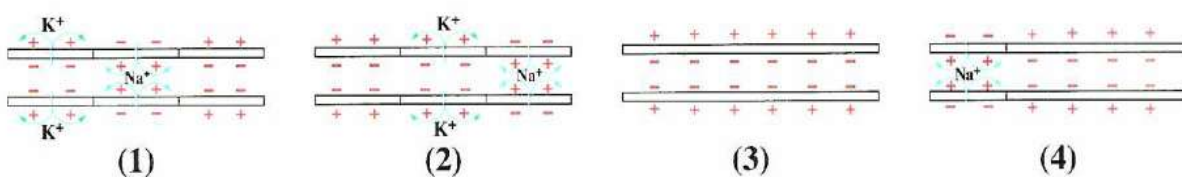
- (a) **What** is the difference between the two structures no. (1) and (2)?
- (b) **Determine** the direction of the nerve impulse transmission in structure no. (3).
With explanation.



6 When the nerve cell is subjected to a certain stimulus, a group of changes occurs to it which leads to the occurrence of depolarization state to the nerve cell:

- (a) **Explain how** the depolarization of nerve cell occurs.
- (b) **How** does the nerve cell return to its original state at rest (polarization state)?

7 Arrange the following stages of the nerve impulse, starting from the rest state, then **mention** the direction of the nerve impulse transmission. **Then explain your answer.**



8 A cell can receive signals from thousands of synapses for a single coordinated response. Mention one example for these cells with determining its location.

9 Nerve function and integrity can be assessed by the Nerve Conduction Velocity (NCV) test. **How** is this test performed? **And how** safe is it?

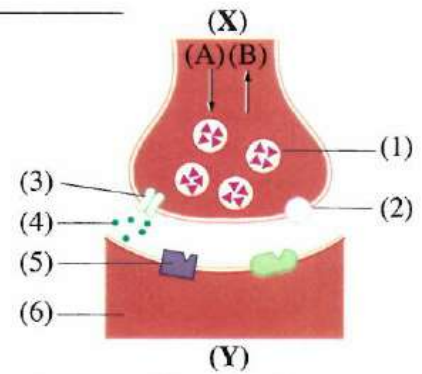
10 The opposite figure represents the transmission of nerve impulse through the synapse:

(a) Mention the number and name of the structure that:

1. Receives the acetylcholine.
2. Contains the neurotransmitters.

(b) Which arrow (A) or (B) represents the direction of the nerve impulse?

(c) What is the importance of structure no. (4) in transmitting the nerve impulse?



11 "Nervous system has a role in the stability and balance of the biosphere".
Explain this statement.

Questions that measure high levels of thinking

Answered in detail

Choose the correct answer:

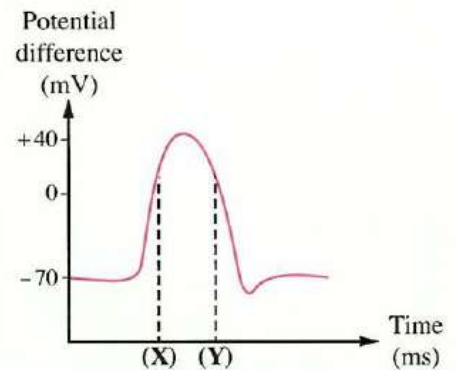
1 From the opposite graph, which of the following figures expresses the state of the nerve cell membrane at the time period between the two points (X) and (Y)?

Outside the cell $-----$
Inside the cell $++++++$
(a)

Outside the cell $++++++$
Inside the cell $-----$
(b)

Outside the cell $++--++$
Inside the cell $--++--$
(c)

Outside the cell $--++--$
Inside the cell $++--++$
(d)



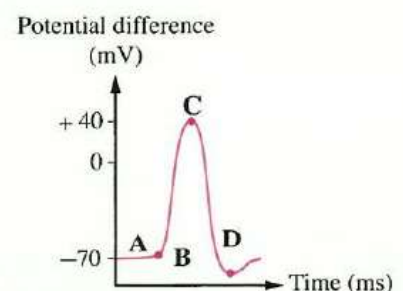
Answer the following questions:

2 **Explain:** The inhibition of sodium-potassium pump by the Ouabain poison (snake venom) leads to stopping the action of the nervous system.

3 The opposite graph illustrates a nerve cell which was exposed to stimulation:

(a) What does the state of the nerve cell represent at (A) and (C)?

(b) What is the difference between period (BC) and period (CD)?



First

Multiple Choice Questions

Questions signed by * are answered in detail.



Interactive
test

Nanotechnology - Nanomaterials

- 1 Which of the following scientific results is related to the appearance of nanotechnology?
 - (a) Identifying the type of chemical reactions.
 - (b) Controlling the structure of matter at the molecular and atomic levels.
 - (c) Detecting what is larger than living cells.
 - (d) Calculating the change in the heat content of chemical reactions.
- 2 Nanotechnology contributes to the sustainability of biosphere because it
 - (a) relies on polluted materials
 - (b) reduces energy and resource consumption
 - (c) produces toxic waste
 - (d) uses fossil fuel
- 3 What does the word “Nano” mean in Greek?
 - (a) Huge.
 - (b) Unique.
 - (c) Dwarf.
 - (d) Perfect.
- 4 The diameter of a single human hair is approximately
 - (a) 10^3 nm
 - (b) 10^5 nm
 - (c) 10^{-5} nm
 - (d) 10^9 nm
- 5 One meter is equivalent to
 - (a) 10^9 nm
 - (b) 10^{-9} nm
 - (c) 10^3 nm
 - (d) 10^{-3} nm
- 6 Quantum effects in a material appear when
 - (a) the dimensions of particles become comparable to each other
 - (b) the ratio between the volume of particles and its surface area increases
 - (c) the dimensions of the material's particles become comparable to the wavelengths associated with electron motion
 - (d) the dimensions of the material's particles are larger than the wavelengths associated with electron motion
- 7 Which of the following occurs to the number of particles and the total volume of a crystallized mass of salt on its grinding respectively?
 - (a) Constant / Decreases.
 - (b) Increases / Constant.
 - (c) Constant / Constant.
 - (d) Increases / Increases.

8 The hardness of copper increases on the nanoscale due to

- (a) an increase in the number of electrons in its atoms
- (b) the spacing between molecules
- (c) an increase in the surface area-to-volume ratio
- (d) an increase in the volume-to-surface area ratio

9 Which of the following choices in the table is correct when comparing a mass of grinded (powdered) sugar with the same mass of a sugar cube?

	Grinded (powdered) sugar	Sugar cube
(a)	Faster dissolution	Slower dissolution
(b)	Larger volume	Smaller volume
(c)	Smaller surface area	Larger surface area
(d)	Smaller number of molecules	Larger number of molecules

10 The unique properties of nanomaterials are attributed to the high ratio between

- (a) the volume and mass of the material
- (b) the density and volume of the material
- (c) the mass and the surface area of the material
- (d) the surface area and the volume of the material

11 When an amount of substance is divided into particles on the nanoscale, which of the following properties remain constant?

- (a) Surface area and total volume.
- (b) Mass and total volume.
- (c) Solubility and electrical conductivity.
- (d) Hardness and optical properties.

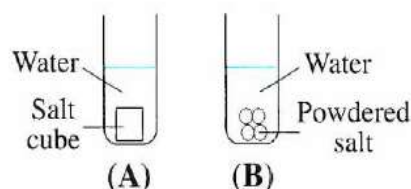
12 Which of the following represents the change that occurred in the surface area and the total volume of a cube, when being divided into parts?

- (a) Both the cube surface area and volume decrease.
- (b) The cube surface area increases and the volume decreases.
- (c) The cube surface area decreases and the volume remains constant.
- (d) The cube surface area increases and the volume remains constant.

13 When comparing the surface area of iron filings to the surface area of an iron cube having the same volume, we find that the

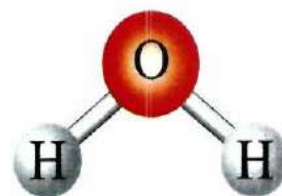
- (a) surface areas of both iron filings and iron cube are equal
- (b) iron cube has a larger surface area
- (c) iron filings have larger surface area
- (d) answer can't be determined

- 14 The opposite figure shows two test tubes (A) and (B), where tube (A) contains a cube of salt its mass is 5 g in a certain amount of water and tube (B) contains the same amount of salt in a powdered form in an equal amount of water. Which of the following choices is correct?
- (a) The content of tube (A) is more conductive for electricity than the content of tube (B).
 (b) The dissolution rate of the salt in tube (B) is greater than that in tube (A).
 (c) The surface areas of the salts are equal in both tubes (A) and (B).
 (d) The molecular structure of tube (A) content is different from that of tube (B) content.



- 15 Gold may be found on the nanoscale in all of the following colors, **except**
 (a) red (b) orange (c) blue (d) yellow
- 16 Copper nanowires and ordinary copper wires have the same
 (a) color (b) hardness
 (c) electrical conductivity (d) chemical structure
- 17 As the particle size of copper decreases, its hardness and electrical conductivity respectively.
 (a) increases / changes (b) increases / doesn't change
 (c) doesn't change / increases (d) doesn't change / doesn't change
- 18 * The ratio between the diameter of a sand grain and a human hair
 (a) is greater than 1 (b) is less than 1 (c) equals 1 (d) equals zero

- 19 * The diameter of the molecule shown in the opposite figure is approximately
 (a) 0.3 m
 (b) 3 nm
 (c) 3×10^{-10} m
 (d) 0.3×10^{-9} nm



→ Nanochemistry

- 20 Which of the following characterizes porous nanomaterials?
 (a) Their three dimensions are on the nanoscale and they have a nanostructure.
 (b) Their three dimensions are not on the nanoscale and they have a nanostructure.
 (c) They have one nanoscale dimension and two non-nanoscale dimensions.
 (d) They have two nanoscale dimensions and one non-nanoscale dimension.
- 21 All the following are one-dimensional nanomaterials, **except**
 (a) thin films (b) carbon nanotubes (c) nanowires (d) nanofibers

22 Which of these materials contain only one dimension that is **not** on the nanoscale?

- (a) Gold nanoparticles. (b) Thin films.
(c) Carbon nanotubes. (d) Quantum dots.

23 * A silver nanoparticle has two dimensions of 25 nm, and 30 nm, what is the probable third dimension of this particle?

- (a) 60 cm (b) 30 nm (c) 25 mm (d) 1000 nm

24 * The following dimensions are of a thin layer of the nanoceramic layers:

- 320 nm • 135 nm • 40 nm

These layers are considered from

- (a) one-dimensional nanomaterials (b) two-dimensional nanomaterials
(c) three-dimensional nanomaterials (d) zero-dimensional nanomaterials

25 * What are the possible dimensions of the shown figure?

- (a) (322 nm / 83 nm / 720 nm).
(b) (179 nm / 180 nm / 11 nm).
(c) (86 nm / 94 nm / 91 nm).
(d) (196 nm / 201 nm / 278 nm).



Examples of the nanotechnology applications in biosphere

26 Which of the following represents an application of programmed nanoparticles?

- (a) Cancer treatment. (b) Repairing damaged nerves.
(c) Controlling prosthetic limbs. (d) Biofuel cells.

27 Which of the following explains the description of conventional cancer treatment as a "double-edged sword"?

- (a) It may kill infected cells or it may not.
(b) It kills healthy cells and the patient's body rejects it.
(c) It kills infected and uninfected cells.
(d) It increases the growth rate of infected and uninfected cells.

28 All of the following represent the role of nanoparticles in cancer treatment, **except**

- (a) reducing the side effects of treatment
(b) destroying uninfected cells adjacent to infected cells
(c) reducing the chances of the exposure of uninfected tissues to toxic substances
(d) increasing the effectiveness of treatment on infected cells

- 29 When using nanoparticles that are **not** targeted specifically to cancerous cells, the most probable result is
- (a) increasing treatment efficiency
 - (b) the drug does not reach any cells
 - (c) the occurrence of side effects similar to conventional treatment
 - (d) increasing the rate of division of all body cells
-
- 30 In drug delivery using nanotechnology, nanoparticles help to
- (a) distribute the drug throughout the body
 - (b) increase the effect of the drug dose
 - (c) deliver the drug directly to infected cells
 - (d) prevent drug absorption
-
- 31 When a section of a nerve cell's axon is cut, the nerve impulse that passes through the cells
- (a) transmits faster
 - (b) transmits slower
 - (c) is unaffected
 - (d) stops
-
- 32 Which of the following technologies act as a bridge for the nerve impulse?
- (a) Nanowires.
 - (b) Neural nanotech interfaces.
 - (c) Quantum dots.
 - (d) Gold nanoparticles.
-
- 33 The success of the nanobridge in transmitting signals between two regions of a damaged nerve depends primarily on
- (a) the direction of the nerve impulse
 - (b) the ability of the nanomaterial to conduct electricity
 - (c) the speed of nerve impulse transmission
 - (d) the rate of nerve healing
-
- 34 * What is the nanostructure that enables the movement of the right arm after it has been stopped for a period of time?
- (a) A neural nanotech interface in the brain.
 - (b) A neural nanotech interface in the arm.
 - (c) A nanobridge in the nerve that transmits the signal to the arm.
 - (d) A nanobridge in the nerve that transmits the signal to the brain.
-
- 35 Which of the following nanomaterials are used to transmit neural signals to a prosthetic limb for a patient?
- (a) Carbon nanotubes.
 - (b) Nanowires.
 - (c) Silver nanoparticles.
 - (d) Neural nano-electrodes.

- 36 The operation of biofuel cells is similar to cellular respiration in that both
(a) produce energy from the oxidation of glucose
(b) produce ATP molecules
(c) store energy
(d) depend on sunlight for their operation
- 37 Which of the following is considered a center for energy production within a living cell?
(a) Nucleus. (b) Mitochondria.
(c) Vacuole. (d) Cellular membrane.
- 38 Which of the following substances are necessary for producing energy in the living cell directly?
(a) Glucose in the presence of oxygen.
(b) Glucose in the presence of carbon dioxide.
(c) Lipids in the presence of oxygen.
(d) Lipids in the presence of carbon dioxide.
- 39 What is the type of energy that is produced from cellular respiration and biofuel cells, respectively?
(a) Light energy / Thermal energy.
(b) Chemical energy / Electrical energy.
(c) Electrical energy / Thermal energy.
(d) Chemical energy / Light energy.
- 40 Nanoparticles are used in biofuel cells because they
(a) reduce the rate of reactions
(b) increase the efficiency of electron transfer
(c) prevent the oxidation of reactants
(d) inhibit the action of enzymes
- 41 * The operation of biofuel cells differs from the process of cellular respiration in
(a) the type of energy required to initiate reactions
(b) loss of electrons from glucose
(c) the type of produced energy
(d) the presence of enzymes necessary for glucose oxidation

Second Miscellaneous Questions

1 Write the scientific term for each of the following statements:

- (a) A technology of manipulating substances at extremely small dimensions measured in nanometers.
- (b) A very small unit of measurement equal to one billionth of a meter.
- (c) Materials with at least one dimension ranging between 1:100 nm.
- (d) Effects that appear when the dimensions of a particle become comparable to the wavelengths associated with electron motion.
- (e) The branch of science that studies the synthesis, description and application of nanomaterials, and is concerned with understanding the changes in properties on this small scale.
- (f) Nanomaterials have only one dimension outside the nanoscale.
- (g) Nanomaterials have only one dimension inside the nanoscale.
- (h) Cells used to produce electrical energy in a way similar to cellular respiration.

2 Give reasons for:

- (a) The properties of a piece of iron differ from the properties of iron filings.
- (b) The activity of chemical reactions in nanoparticles increases compared to the normal size of the material.
- (c) The use of nanowires in the medical field, especially in the field of neuroscience.
- (d) Chemotherapy and radiotherapy for cancer are considered a double-edged sword.
- (e) The use of carbon nanotubes when there is damage in a part of the neural pathway.
- (f) Neural nanotech interfaces play an important role in helping paralyzed patients.
- (g) The use of carbon nanotubes to coat electrodes inside biofuel cells.

3 What happens in each of the following cases:

- (a) Dissolving a sugar cube in water and dissolving another cube of the same mass, after dividing it, in an equal amount of water under the same conditions "with respect to the rate of dissolution".
- (b) Reducing the size of the material to the nanoscale "with respect to its properties".
- (c) Reshaping gold on the nanoscale "with respect to its color".
- (d) Reducing copper particles to the nanoscale "with respect to its hardness".
- (e) Using nanoparticles as drug carriers in cancer treatment.
- (f) The occurrence of damage in any part of the neural pathway "with respect to the nerve impulse".
- (g) Using biofuel cells to oxidize glucose inside the body "with respect to the produced energy".

4 Compare between each of the following:

- (a) Zero-dimensional nanomaterials **and** three-dimensional nanomaterials "in terms of: dimensions – examples"

- (b) Cancer treatment **and** repairing damaged nerves using nanotechnology "in terms of: the type of nanomaterials used – idea of work".
- (c) Repairing damaged nerves **and** controlling prosthetic limbs using nanotechnology "in terms of: the type of nanomaterial used – treatment result".

5 Explain one use for each of the following:

- (a) Nanowires. (b) Carbon nanotubes.
- (c) Nanotech interfaces in brain.

6 The opposite figure represents two types of gold rings, rings (1) are red, while ring (2) is golden.

What is the scientific explanation of the red color of the rings (1)?



- 7 What** are the factors that lead to changes in the properties of the material on the nanoscale?
- 8 What** are the unique properties of two-dimensional nanomaterials?
- 9 Explain** the role of nanowires in nerve conduction when there is a defect in a part of the synapse.
- 10 What** is the role of biofuel cells in energy production?

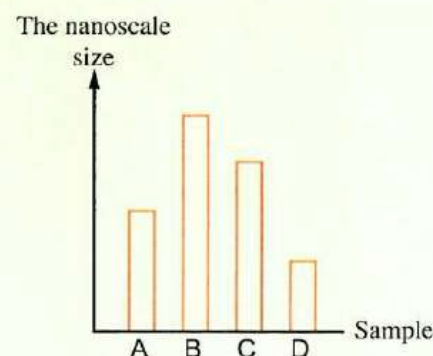
Questions that measure high levels of thinking

Answered in detail

Choose the correct answer:

- 1** The opposite figure represents the nanoscale size of 4 samples of copper. Which of these samples is the hardest?

- (a) A
(b) B
(c) C
(d) D



- 2** Which of the following materials can have these dimensions?

$$200 \times 10^{-9} \text{ m}$$

$$3 \times 10^{-6} \text{ m}$$

$$20 \times 10^{-10} \text{ m}$$

- (a) Thin films. (b) Nanowires.
- (c) Carbon nanotubes. (d) Porous nanomaterials.

Questions ?

Unit Four | Lesson 1

Answered

First

Multiple Choice Questions

Questions signed by * are answered in detail.



Interactive
test

The Earth's layers

- 1 Continental crust rocks differ from oceanic crust rocks in all of the following, except

(a) mineral composition	(b) density
(c) thickness	(d) physical state
- 2 Which of the following choices describes the mantle?

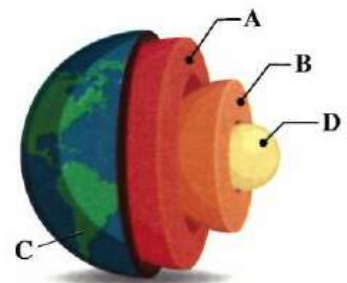
(a) The lower part is ductile.
(b) It consists of iron and nickel.
(c) The largest Earth's layer in terms of mass.
(d) It consists of igneous, sedimentary and metamorphic rocks.
- 3 One of the Earth's layers in which the temperature reaches up to 5000°C is

(a) outer core	(b) asthenosphere
(c) oceanic crust	(d) continental crust
- 4 * If the mass of the mantle is (X), the mass of the core is approximately.....

(a) X	(b) $\frac{1}{2}$ X	(c) 2X	(d) 3X
-------	---------------------	--------	--------
- 5 The opposite model represents the Earth's layers.
What is the letter that refers accurately to sial rocks?

(a) A
(b) B
(c) C
(d) D
- 6 The total sum of the volume percentages of the mantle and the core from the Earth's total volume is approximately

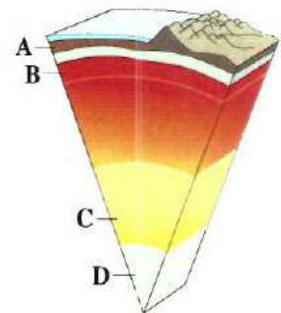
(a) 50%	(b) 75%	(c) 97%	(d) 99%
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- 7 The floor of the Atlantic ocean mostly contains rocks rich in
- (a) silica and aluminum (b) aluminum and magnesium
(c) silica and magnesium (d) potassium and magnesium

- 8 How far the two statements: "The continental crust has greater thickness than the oceanic crust", "The oceanic crust has lower density than the continental crust" are correct?
- (a) Both statements are correct.
(b) The first statement is correct and the second statement is false.
(c) Both statements are false.
(d) The first statement is false and the second statement is correct.

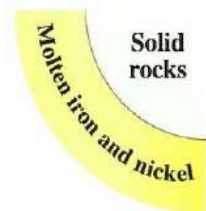
- 9 In front of you a model of a section in the planet Earth.
The letters (A), (B), (C) and (D) represent four different layers.
Which of these layers contains ductile rocks?



- (a) A
(b) B
(c) C
(d) D

- 10 The chemical composition of the Earth's inner core and the upper mantle are similar in the presence of
- (a) iron (b) magnesium (c) nickel (d) silica

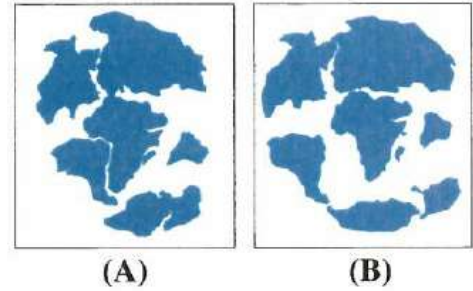
- 11 The opposite section represents a part of Earth's layers, the movement of elements in the outer molten part causes
- (a) the tectonic plates movement
(b) the solidity of the rocks of the Earth's center
(c) the balance between the continental crust and oceanic crust
(d) the origin of the magnetic field



- 12 Sima rocks are characterized by
- (a) being ductile and behave like fluids
(b) being rich in silica, magnesium and iron
(c) being the main component of continents
(d) the occurrence of convection currents within them

- 13 The solidity of the inner core rocks is due to
- (a) increased pressure exerted upon them
(b) rotation of molten iron and nickel around them
(c) their high temperature
(d) containing silica in high percentages

- 14 Maps (A) and (B) show the positions of the continents related to each other during different periods of time. The change in the positions of the continents is due to



- (a) temperature variation in the outer core
- (b) the origin of the Earth's magnetic field
- (c) the occurrence of the convection current eddies in the mantle
- (d) the occurrence of chemical weathering

- 15 Earth's magnetic field contributes to

- (a) the occurrence of volcanoes and earthquakes
- (b) blocking harmful cosmic rays
- (c) increasing the speed of Earth's rotation
- (d) the stability of Earth's temperature

Lithosphere

- 16 All of the following describe the lithosphere, **except** that it

- (a) is a dynamic system changes over time
- (b) has an average thickness of about 100 km
- (c) is bordered by the outer core from below
- (d) is the surface on which topography is formed

- 17 The lithosphere helps to reduce the phenomenon of the greenhouse effect over the long term by

- (a) increasing the percentage of water vapor in the atmospheric air
- (b) increasing the percentage of chlorofluorocarbon compounds in the atmospheric air
- (c) converting a portion of CO_2 gas into dissolved ions in water
- (d) absorbing O_2 gas from the atmospheric air by silicate minerals

- 18 The lithosphere of planet Earth includes

- (a) the Earth's crust and the solid upper part of the mantle
- (b) the lower part of the Earth's crust and the asthenosphere
- (c) the continental crust and the entire mantle
- (d) the oceanic crust and the entire mantle

- 19 Which of the following factors has the greatest effect on the chemical weathering of rocks that contain silicate minerals such as calcium pyroxene?

- (a) Increasing the density of the surrounding rocks.
- (b) Decreasing the salinity of water in rock cracks.
- (c) Increasing the concentration of CO_2 in rainwater.
- (d) Increasing the air temperature.

- 20 When using water from a groundwater well, it was found that it reduces the effectiveness of soap and this indicates
- (a) an increase in the concentrations of sodium and chlorine ions in it
 - (b) a decrease in the percentage of dissolved CO_2 gas in water
 - (c) an increase in the concentrations of magnesium and calcium ions
 - (d) the presence of organic compounds that are insoluble in water
-
- 21 What is the type of the chemical bond that its presence in a mineral, makes it easily soluble in water?
- (a) Covalent bonds.
 - (b) Metallic bonds.
 - (c) Hydrogen bonds.
 - (d) Ionic bonds.
-
- 22 If an area is found to contain thin layers of limestone with cavities in them, this indicates that
- (a) the limestone has high hardness
 - (b) the limestone has undergone chemical weathering
 - (c) the soil in this area is poor in mineral elements
 - (d) the solubility of limestone in water is low
-
- 23 The opposite sample represents sandstone rock, the mineral composing it does not break down easily when exposed to acid rain because of
- (a) the presence of covalent bonds between the mineral's atoms
 - (b) the high melting point of the mineral
 - (c) the presence of ionic bonds between the mineral's atoms
 - (d) the presence of magnesium ions in the mineral
- 
-
- 24 Which of the following factors does **not** affect the solubility of minerals in water?
- (a) The nature of the chemical bonds in the mineral.
 - (b) The water temperature.
 - (c) The pressure exerted on water.
 - (d) The density of the mineral.
-
- 25 Which of the following choices represents the reason for the formation of limescale deposits in water pipes?
- (a) A decrease in the temperature of water in the pipes.
 - (b) The presence of high concentrations of calcium and magnesium ions.
 - (c) Water contains quartz.
 - (d) A decrease in the pressure exerted on water in the pipes.

26 Porous volcanic rocks are used for water treatment in some water purification plants, because they.....

- (a) increase the viscosity of water
- (b) trap impurities and heavy metals from water
- (c) prevent water from seeping through them
- (d) convert water into carbonic acid

27 The phenomenon shown in the opposite figure is an example for factors that affect the mineral solubility, which is.....

- (a) groundwater containing CO_2 gas
- (b) increasing the concentration of carbonate salts in water
- (c) increasing the water temperature
- (d) water containing the element silicon



28 Which of the following is **not** considered an importance of the lithosphere?

- (a) It represents the solid part for everything above it.
- (b) It works to reduce the concentration of CO_2 in the air.
- (c) It supplies the hydrosphere with mineral elements.
- (d) It contributes to the occurrence of water hardness.

29 Which of the following ions is primarily released from granite rock due to chemical weathering and is used directly in regulating the opening and closing of stomata in plants?

- (a) Iron.
- (b) Potassium.
- (c) Aluminum.
- (d) Silica.

30 All of the following affect the quality of water used in agriculture, **except**.....

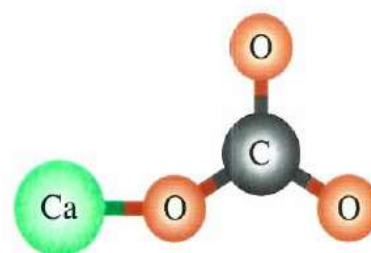
- (a) an increase in the percentage of carbonic acid in water
- (b) an increase in the concentration of carbonate salts in water
- (c) weakness of the hydrogen bonds between water molecules
- (d) an increase in the percentage of calcium and magnesium ions in water

31 Which of the following statements explains the reason for the increased solubility of some minerals in deep groundwater?

- (a) Decreasing the pressure exerted on the water.
- (b) Decreasing the water temperature.
- (c) Reducing the solubility of the dissolved gases in water.
- (d) Increasing the pressure exerted on water.

- 32 * The opposite figure represents the molecular structure of a mineral, this mineral differs from quartz in

- (a) containing the oxygen element
- (b) the release of carbon ions from it when it decomposes
- (c) difficulty of its dissociation in water
- (d) binding of its atoms by ionic bonds



- 33 Zeolite rock is used in water purification processes, because the rock

- (a) contains high percentages of magnesium ions
- (b) contains CO_2 gas which makes the water acidic
- (c) acts as a porous filter that traps impurities
- (d) contains chemical substances that dissolve impurities

- 34 If the falling rate of acid rain increases in an area containing phosphate rocks, it is expected that

- (a) phosphorus is released into the atmosphere
- (b) their minerals are dissociated into ions that the plant absorbs
- (c) the acidity of the rainwater increases
- (d) the temperature of the rocks increases

- 35 The effect of the lithosphere on the biosphere includes

- (a) providing oxygen directly to plants
- (b) producing mineral elements necessary for plant growth
- (c) blocking harmful cosmic rays
- (d) preventing water from seeping into the soil

- 36 Which of the following reacts faster with acid rain?

- (a) Quartz. (b) Limestone. (c) Sandstone. (d) Zeolite.

- 37 The table in front of you refers to some components of the lithosphere, which of the following represents the components

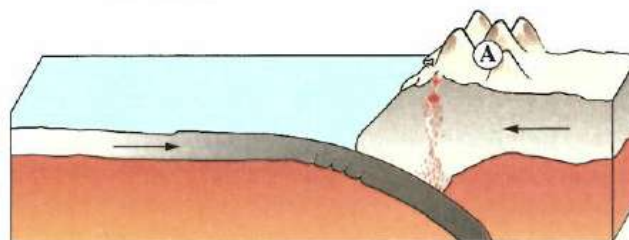
(X, Y and Z) respectively?

- (a) Soil / Minerals / Rocks.
- (b) Minerals / Soil / Rocks.
- (c) Rocks / Minerals / Soil.
- (d) Soil / Rocks / Minerals.

X	Forms the solid Earth's crust.
Y	Inorganic materials used in industry.
Z	Retains nutrients for plants.

— Tectonic plates

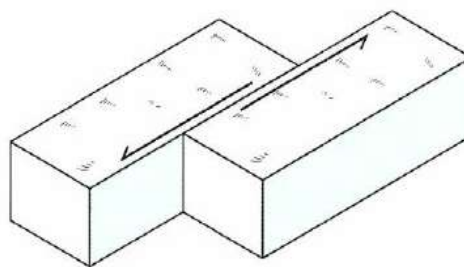
- 38 The movement of tectonic plates works on
- originating the Earth's magnetic field
 - shaping the Earth's surface and maintaining its balance
 - rotating planet Earth around its axis
 - decreasing the amount of acid rain
- 39 The sides of the Red Sea widen at a rate of 2.5 cm for each year as the Arabian plate moves away from the African plate due to
- strong winds on the Earth's surface
 - the movement of the convection currents in the asthenosphere
 - rotation of molten iron and nickel around the inner core
 - the force of the tides in the sea water
- 40 * The collision of Indian continental plate with the Eurasian continental plate leads to the formation of the Himalayas which contain
- solid iron and nickel
 - silicate sima rocks
 - molten iron and nickel
 - silicate sial rocks
- 41 Part (A) in the opposite figure is formed as a result of
- convergent movement
 - divergent movement
 - vibrational movement
 - transform movement



- 42 Which of the following is formed as a result of transform movement of tectonic plates?
- The Himalayas.
 - The Red Sea.
 - San Andreas fault.
 - The African rift.
- 43 The movement of a tectonic plate along the edge of another tectonic plate parallel to it results in
- frequent and destructive earthquakes
 - a new ocean floor
 - rifts and valleys
 - volcanic mountain ranges

- 44 ✨ Which of the following results from the movement of the tectonic plates shown in the opposite figure?

- (a) The Red Sea.
- (b) The Mediterranean Sea.
- (c) San Andreas fault.
- (d) Andes mountains.

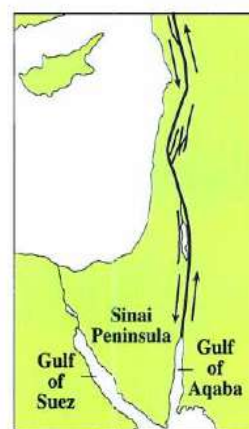


- 45 The movement of the tectonic plates that leads to the widening of coastal valleys is

- (a) divergent
- (b) convergent
- (c) transform
- (d) vibrational

- 46 The opposite map shows Sinai Peninsula, the tectonic movement indicated by the arrows on the map is movement.

- (a) divergent
- (b) transform
- (c) convergent
- (d) collisional



- 47 Which of the following is **not** a result of divergent movement of tectonic plates?

- (a) Atlantic ocean.
- (b) The Himalayas.
- (c) The African rift.
- (d) Coastal valleys.

- 48 Which of the following results from a collisional movement between tectonic plates?

- (a) San Andreas fault.
- (b) The African rift.
- (c) The Himalayas.
- (d) Atlantic ocean floor.

Second Miscellaneous Questions

- 1 Write the scientific term for each of the following statements:

- (a) The outermost thin solid layer of planet Earth.
- (b) One of the Earth's layers that represents 67% of the Earth's mass.
- (c) A part of the upper mantle in which convection currents spread.
- (d) A phenomenon resulting from the rotation of the outer core around the inner core and protects Earth from harmful cosmic rays.
- (e) The geological unit consisting of the Earth's crust and the solid upper part of the mantle.

- (f) One of the fundamental components of the lithosphere that is crucial for agriculture.
- (g) A property of water resulting from containing high concentrations of dissolved calcium and magnesium ions.
- (h) Large rock masses that resemble floating plates forming the lithosphere.

2 Give reasons for:

- (a) The lithosphere is a dynamic system and not a static one.
- (b) The oceanic crust has higher density than the continental crust.
- (c) The mantle is divided into two parts that differ in physical properties.
- (d) Increased the solidity of the lower mantle rocks, despite its high temperature.
- (e) The origin of the Earth's magnetic field.
- (f) The lithosphere is considered the foundation on which the other Earth's spheres depend.
- (g) Hard water has many negative effects.
- (h) Sandstone is more resistant to weathering than limestone.
- (i) Hot spring water has a high ability to dissolve minerals.
- (j) The formation of caves and cavities in limestone rocks.
- (k) Zeolite rocks are used in water treatment and purification.
- (l) Plants need for potassium ions.
- (m) The formation of the Himalayas.
- (n) The formation of the African rift.
- (o) The occurrence of the San Andreas fault.

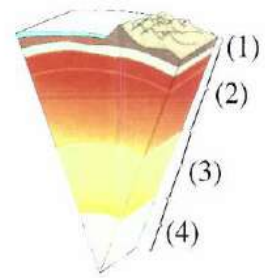
3 What happens in each of the following cases:

- (a) Water and carbon dioxide react with silicate rocks, such as basalt rich in calcium pyroxene?
- (b) Water passes through different rock layers "in terms of: water properties"?
- (c) The use of groundwater containing high concentrations of calcium and magnesium ions "in terms of: water use in homes"?
- (d) Acid rain falls on layers from limestone?
- (e) Deep groundwater contains high percentages of CO₂ gas?
- (f) Phosphate rocks are exposed to weathering factors?
- (g) Acid rain falls on granite rock?
- (h) Two tectonic plates move away from each other?
- (i) One of the two tectonic plates sticks while sliding alongside each other?
- (j) Two tectonic plates collide with each other?

4 The opposite figure shows a model of the Earth:

From the figure, **deduce** the name and number of the layer that:

- (a) Consists of molten iron and nickel.
- (b) A part of it contains ductile rock materials that contributes to the movement of the continents above it.

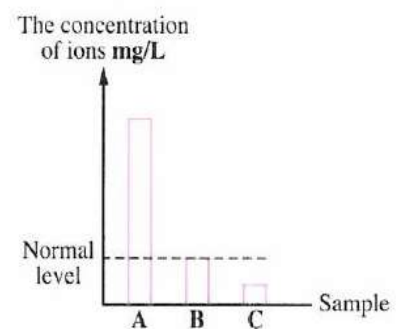


5 State the importance of the Earth's magnetic field.

6 Compare between minerals with ionic bonds and minerals with covalent bonds "**in terms of:** the ability to dissolve in water - an example for each".

7 From the opposite graph that shows the concentrations of calcium and magnesium ions in three samples of groundwater, deduce:

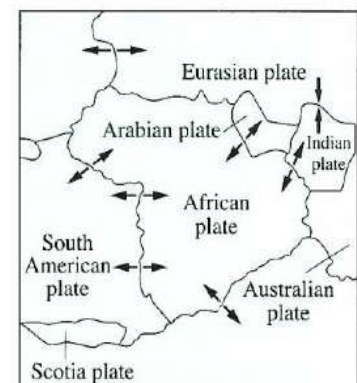
- (a) **What** is the sample that represents hard water?
Explain your answer.
- (b) **What** are the harms caused by this type of water?



8 The opposite map shows some tectonic plates and the arrows indicate their direction of movement.

Study it well and then answer:

- (a) **What** is the type of movement occurs between the Indian plate and the Eurasian plate? **What** is the geological phenomenon that results from this movement?
- (b) **What** is the type of movement occurs between the African plate and the South American plate?



9 The Earth is divided into several layers that are similar in some properties and differ in others. Based on this, explain:

- (a) A difference between the asthenosphere and the lower mantle.
- (b) A similarity between the inner core and the outer core.

10 What are the most important factors that control the amount of minerals that dissolve in water?

Questions ?

Unit Four | Lesson 2

Answered

First Multiple Choice Questions

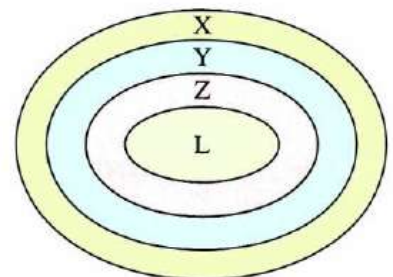
Questions signed by * are answered in detail.



Interactive
test

Properties of minerals and rocks

- 1 The interaction of minerals that form rocks with living organisms and other non-living components leads to all of the following, **except**
 - (a) formation of the hydrosphere
 - (b) release of some nutrients of plants
 - (c) soil formation and increased thickness
 - (d) facilitating the movement of water and gases through rocks
- 2 The mineral quartz consists of a group of
 - (a) chemical compounds
 - (b) rocks
 - (c) elements
 - (d) gases
- 3 In the opposite diagram, if (L) represents chemical elements, (Z) and (X) could represent respectively
 - (a) minerals / rocks
 - (b) rocks / minerals
 - (c) minerals / lithosphere
 - (d) lithosphere / minerals
- 4 The substance is called "mineral" when all the following conditions are exist, **except** that it is.....
 - (a) solid
 - (b) crystalline
 - (c) organic
 - (d) natural
- 5 Petroleum is **not** considered a mineral, because it is.....
 - (a) organic and manufactured
 - (b) liquid and organic
 - (c) inorganic and liquid
 - (d) inorganic and non-crystalline
- 6 Which of the following is considered a mineral?
 - (a) Glass made from quartz.
 - (b) Pottery made from clay.
 - (c) Petroleum that is used as a fuel.
 - (d) Calcite that is used in cement industry.



- 7 * The opposite table illustrates some properties of four different substances, which of these substances is likely to be a mineral?

Substance (X)	Substance (Y)	Substance (Z)	Substance (L)
Solid	Solid	Liquid	Solid
Natural	Natural	Natural	Manufactured
Organic	Inorganic	Organic	Inorganic

- (a) X (b) Y
(c) Z (d) L

- 8 When rubbing a sample of gypsum against a sample of quartz, which one scratches the other?

- (a) Gypsum scratches quartz. (b) Quartz scratches gypsum.
(c) Each scratches the other. (d) Neither scratches the other.

- 9 Which of the following minerals have a low degree of hardness?

- (a) Gypsum and feldspar. (b) Gypsum and calcite.
(c) Calcite and quartz. (d) Quartz and feldspar.

- 10 When making a glass cup, we use a mineral that has a hardness equal to

- (a) 2 (b) 5 (c) 6 (d) 7

- 11 Limestone consists of the mineral

- (a) calcite (b) quartz (c) gypsum (d) feldspar

- 12 Which of the following properties **doesn't** affect the mechanical behavior of the rock?

- (a) Color of the minerals composing it. (b) Hardness of the minerals composing it.
(c) Cleavage of the minerals composing it. (d) The fracture of the minerals composing it.

- 13 What is the correct ascending order for the following minerals according to their degree of hardness?

- (a) Quartz → Calcite → Gypsum. (b) Gypsum → Calcite → Quartz.
(c) Calcite → Gypsum → Quartz. (d) Gypsum → Quartz → Calcite.

- 14 Which of the following Ancient Egyptian statues was made from the rock that is composed of minerals with the lowest hardness?

- (a) Khafre. (b) Great Sphinx of Giza.
(c) Amenhotep III. (d) Ramesses II.

- 15 When attempting to scratch a sample of calcite and another of quartz using an iron nail, we find that

- (a) calcite is scratched and quartz is not (b) quartz is scratched and calcite is not
(c) neither of the two minerals is scratched (d) both minerals are scratched

- 16 * An experiment was conducted to determine the hardness of the minerals of a rock, the rock was scratched by an iron nail, while a human fingernail could not scratch it. This rock is likely to be

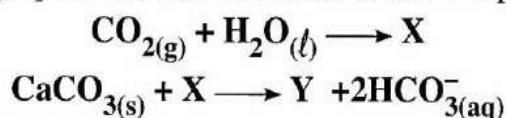
- (a) limestone (b) red granite (c) diorite (d) sandstone

- 17 * The hardness of a human fingernail lies between the hardness of
 (a) calcite and quartz (b) gypsum and calcite
 (c) granite and diorite (d) a piece of metal coin and an iron nail
- 18 The mineral that is characterized by a conchoidal fracture has a hardness of
 (a) 2 (b) 6 (c) 7 (d) 10
- 19 A mineral is characterized by its ability to scratch the glass, this description refers to the property of
 (a) color (b) hardness (c) cleavage (d) luster
- 20 The mineral with the highest hardness in Mohs scale has a hardness of
 (a) 9 (b) 10 (c) 11 (d) 12
- 21 Which of the following minerals can be identified by its color?
 (a) Gold. (b) Malachite. (c) Calcite. (d) Pyrite.
- 22 Gold and pyrite are similar in
 (a) specific gravity (b) luster (c) density (d) composition
- 23 The correct ascending order according to the degree of luster is
 (a) quartz → gold → calcite (b) basalt → calcite → pyrite
 (c) pyrite → quartz → basalt (d) basalt → gold → quartz
- 24 Which of the following represents a similarity and a difference respectively between quartz and calcite?
 (a) Color / Luster. (b) Hardness / Cleavage.
 (c) Luster / Hardness. (d) Hardness / Luster.
- 25 The mineral forming the rock used in making the Great Sphinx of Giza statue is characterized by
 (a) metallic luster (b) glassy appearance
 (c) high hardness (d) conchoidal fracture
- 26 Which of the following elements is the reason for the high relative density of galena?
 (a) Gold. (b) Calcium. (c) Titanium. (d) Lead.
- 27 * When two polished samples of the same volume, one from galena and the other from feldspar, are dropped from a plane into a pool of water, which one reaches the bottom of the pool first?
 (a) Galena reaches first. (b) Feldspar reaches first.
 (c) Both minerals reach at the same time. (d) Both minerals float on the water surface.

- 28 * If the mass of a gold sample is 38.6 g and the mass of the same volume of water at a temperature of 4°C is 2 g, what is the specific gravity of gold?
 (a) 77.2 (b) 38.6 (c) 19.3 (d) 7.5
- 29 We can deduce that the specific gravity of galena is greater than that of feldspar through
 (a) comparing the masses of equal volumes from galena and feldspar
 (b) comparing the volumes of different masses from galena and feldspar
 (c) estimating the mass of a specific volume from galena using a sensitive scale
 (d) estimating the mass of a specific volume from feldspar using a sensitive scale
- 30 * What is the mass of a sample of a mineral whose relative density is 5, if the mass of the same volume of water at a temperature of 4°C is 20 g?
 (a) 5 g (b) 20 g (c) 50 g (d) 100 g
- 31 When mica is subjected to hammering, it cleaves and produces
 (a) smooth surfaces (b) broken surfaces
 (c) irregular surfaces (d) conchoidal fracture
- 32 When a mineral is broken, it forms thin sheets as shown in the opposite figure. This mineral is likely to be
 (a) feldspar
 (b) quartz
 (c) calcite
 (d) mica
- 33 Determining the cleavage property of minerals has a great importance in the engineering field, because cleavage
 (a) determines the behavior of rocks when subjected to mechanical stress
 (b) explains the economic importance of the ores that contain the mineral
 (c) determines the specific gravity of the minerals and their pressure on rocks below them
 (d) explains other physical properties of the mineral, such as hardness
- 34 The multi-colored mineral with glassy appearance that is characterized by low hardness, its chemical composition is
 (a) aluminum silicate (b) silicon dioxide (c) calcium carbonate (d) calcium sulphate



- 35 From the two following equations, what do letters X and Y represent?



- (a) (X) Carbonic acid and (Y) bicarbonate ions.
 (b) (X) Carbon monoxide and (Y) calcium ions.
 (c) (X) Calcium ions and (Y) carbon dioxide.
 (d) (X) Carbonic acid and (Y) calcium ions.

- 36 Which of the following minerals partially dissolves in weak acids?
 (a) Quartz. (b) Feldspar. (c) Calcite. (d) Silicate mica.
- 37 The mineral used in the glass industry belongs to the group.
 (a) silicates (b) carbonates (c) sulphides (d) oxides

Mineral resources in lithosphere

- 38 Minerals support the stability of the Earth through all of the following, **except**
 (a) contributing to the building of continents
 (b) contributing to the rotation of the Earth around its axis
 (c) contributing to determining soil properties
 (d) giving rocks strength and durability
- 39 Quartz crystals oscillate at a constant rate when exposed to
 (a) sunlight (b) an electric potential difference
 (c) thermal energy (d) compressive forces
- 40 The mineral that is characterized by a conchoidal fracture is used in the industry of
 (a) car structures (b) accurate watches (c) prosthetic limbs (d) drone batteries
- 41 The element that is extracted from hematite ore contributes to the industry of
 (a) medical eye lenses (b) electronic chips
 (c) wind turbines (d) batteries of satellites
- 42 New minerals are formed through all of the following processes, **except**
 (a) crystallization of magma inside the Earth's interior
 (b) exposure of rocks to intense heat and pressure
 (c) precipitation of mineral salts when water evaporates
 (d) fragmentation of rocks when exposed to wind
- 43 The aim of the high-speed electric train project in Egypt is to connect
 (a) the cities of the Mediterranean Sea and the Nile River
 (b) the cities of the Mediterranean Sea and the Red Sea
 (c) the Red Sea cities with the Gulf of Suez
 (d) the Gulf of Suez with the Nile River
- 44 Silicon is used in the manufacture of microchips in smartphones, because silicon is characterized by
 (a) its high ability to conduct heat
 (b) its ability to control the flow of electric current in electronic circuits
 (c) its high hardness and ease of shaping
 (d) the change of its physical state when an electric current passes through it

- 45 Lithium is used in the manufacture of the batteries of satellites, because
 (a) it is considered a renewable source of energy
 (b) it stores energy for long periods
 (c) it controls the flow of electric current to the electric circuit
 (d) its physical state changes when electric current passes through it
- 46 It is preferred to manufacture prosthetic limbs from
 (a) iron (b) calcium (c) titanium (d) lithium
- 47 Which of the following elements is characterized by high strength and light weight?
 (a) Lead. (b) Titanium. (c) Iron. (d) Silver.
- 48 Which of the following is used in the manufacture of the batteries of medical devices?
 (a) Iron and cobalt. (b) Lithium and titanium.
 (c) Silicon and titanium. (d) Lithium and cobalt.
- 49 Which of the following groups of elements is used in the manufacture of the Magnetic Resonance Imaging machine?
 (a) Boron, iron and neodymium. (b) Lithium, titanium and boron.
 (c) Neodymium, silicon and lithium. (d) Gold, boron and iron.
- 50 Lithium is used in the manufacture of all the following devices, **except**
 (a) cardiac pacemakers (b) glucose monitors
 (c) batteries of medical pumps (d) MRI machines

Rock cycle

- 51 The first rock cycle starts with the formation of
 (a) igneous rock (b) sedimentary rock
 (c) metamorphic rock (d) marine sediments
- 52 When rocks are exposed to intense rainfall for long periods, are formed.
 (a) igneous rocks (b) sedimentary rocks
 (c) metamorphic rocks (d) disintegrated sediments
- 53 The sediments in the opposite figure were formed directly by the processes of
 (a) cooling and crystallization
 (b) weathering and transportation
 (c) cohesion and lithification
 (d) metamorphism and melting



- 54** The processes that lead directly to the formation of igneous rocks are
- (a) weathering and deposition (b) lithification and metamorphism
(c) weathering and metamorphism (d) melting and crystallization
-
- 55** If sedimentary rocks are metamorphosed into metamorphic rocks, this indicates that the rocks
- (a) were exposed to weathering and erosion factors
(b) melted and then cooled
(c) were exposed to high pressure and temperature without melting
(d) were exposed to melting by high temperature
-
- 56** Which of the following is considered a metamorphic rock?
- (a) Limestone. (b) Sandstone. (c) Marble. (d) Calcite.
-
- 57** Marble rock is formed when limestone is exposed to
- (a) melting (b) weathering (c) heat and pressure (d) lithification
-
- 58** * Calcite forms two different rocks, which are
- (a) limestone and marble (b) limestone and sandstone
(c) marble and granite (d) granite and sandstone

Second

Miscellaneous Questions

- 1** Write the scientific term for each of the following statements:
- (a) A solid, inorganic substance exist in nature that has a fixed or semi-fixed chemical composition and a regular crystalline structure.
(b) A physical property that expresses the resistance degree of a mineral or a rock to scratching.
(c) The extent of light reflection from the surface of a mineral.
(d) The ratio between the mass of a specific volume of a meterial and the mass of the same volume of water at a temperature of 4°C.
(e) The ability of a mineral to split along specific crystalline planes that reflect the structure of the bonds within the crystal.
(f) The pattern of the breakage when the breakage does not follow specific crystalline planes.
-
- 2** Give reasons for:
- (a) Quartz is used in the manufacture of glass tools.
(b) Granite rock is used in the construction of hypermarkets and hospitals.
(c) An iron nail scratches a piece of limestone, while a human fingernail cannot scratch it.

- (d) We can identify malachite through the property of color.
- (e) The property of color is insufficient for identifying most minerals.
- (f) Pyrite is known as "Fool's gold."
- (g) Knowing the cleavage or fracture pattern of a mineral is very useful from an engineering perspective.
- (h) Silicate minerals remain in the soil without decomposition for long periods of time.
- (i) Quartz plays a fundamental role in the manufacture of accurate watches.
- (j) Iron has an important role in producing electricity, reducing harmful emissions and environmental sustainability.
- (k) The Egyptian government's establishment of a high-speed electric rail network.
- (l) Silicon is used in the manufacture of microchips in mobile phones.
- (m) Lithium is called the "Oil of the 21st century."
- (n) The use of nutritional supplements containing calcium and iron.
- (o) Titanium is used in bone and artificial joint implants.

3 What happens in each of the following cases:

- (a) Both granite and limestone are exposed to erosion factors "**regarding:** the ability of each to resist erosion factors"?
- (b) A sample of alabaster is scratched with an iron nail?
- (c) Both feldspar and quartz are broken "**regarding:** the resulting shape of the breakage"?
- (d) A piece of calcite is placed in a solution of dilute carbonic acid?
- (e) Quartz mineral is exposed to an electric potential difference?
- (f) Igneous rock is exposed to intense pressure and heat lower than the melting point in the Earth's interior?

4 Compare between each of the following:

- (a) Quartz and calcite "**in terms of:** hardness degree – the ability to dissolve in weak acids".
- (b) Gold and basalt "**in terms of:** luster".
- (c) The formation method of marble and the formation method of sandstone.

5 Calculate the relative density of a mineral whose mass of a specific volume of it is 75 g, if you know that the mass of the same volume of water at a temperature of 4°C is 25 g.

6 What is the scientific basis on which minerals are classified into mineral groups?

7 What are the ways of forming minerals in the Earth's crust?

8 Minerals contribute to the stability and continuity of the Earth. **Explain.**

- 9 What is the role of mobile phones and navigation devices?

- 10 What is the role played by solar panels?

- 11 Explain the importance of Neodymium – Iron – Boron alloy in Magnetic Resonance Imaging (MRI) machines.

- 12 Gold nano-particles play an important role in treating cancer. **Explain.**

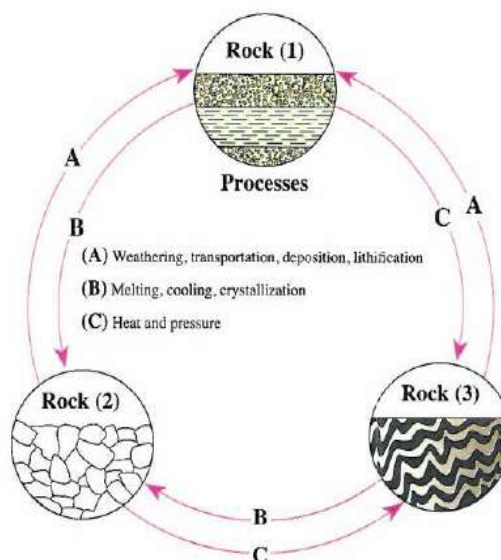
- 13 "The elements lithium and cobalt play an important role in the medical field", **discuss this statement.**

Questions that measure **high levels of thinking**

Answered in detail

Choose the correct answer:

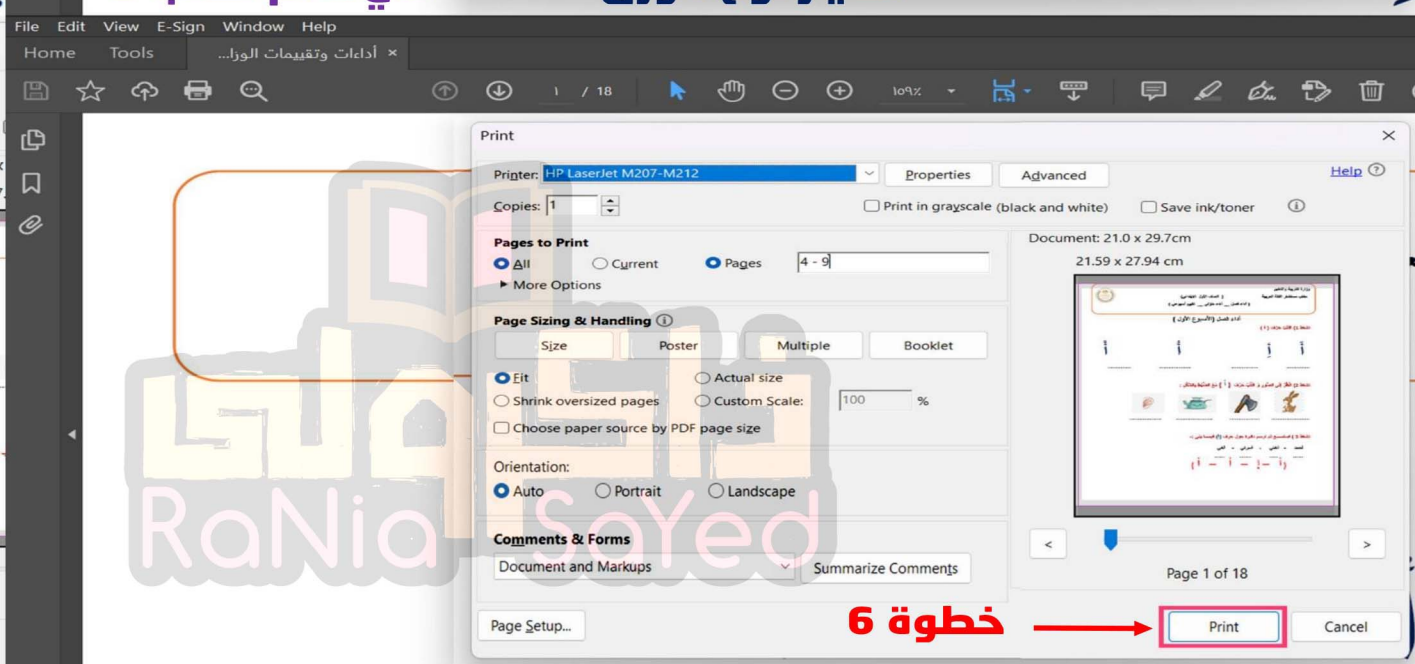
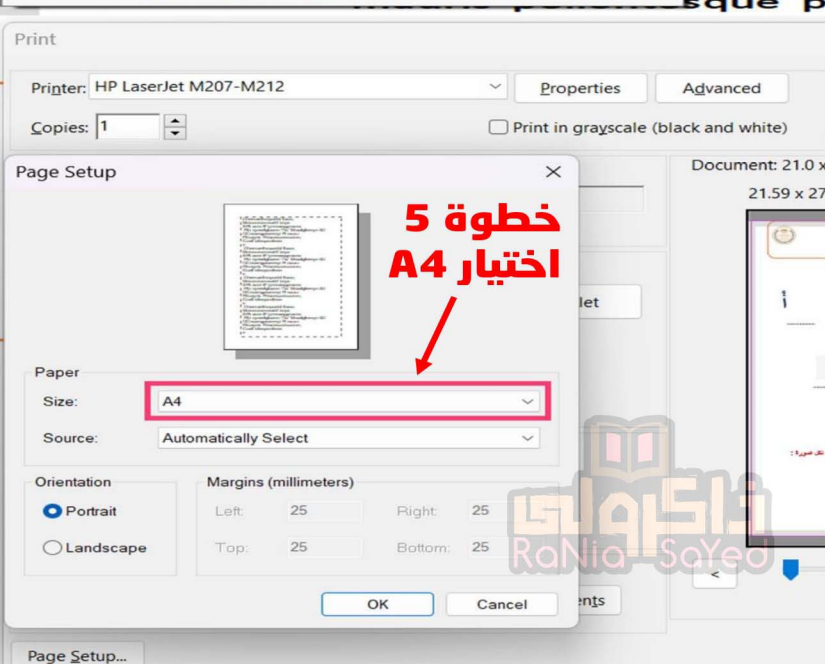
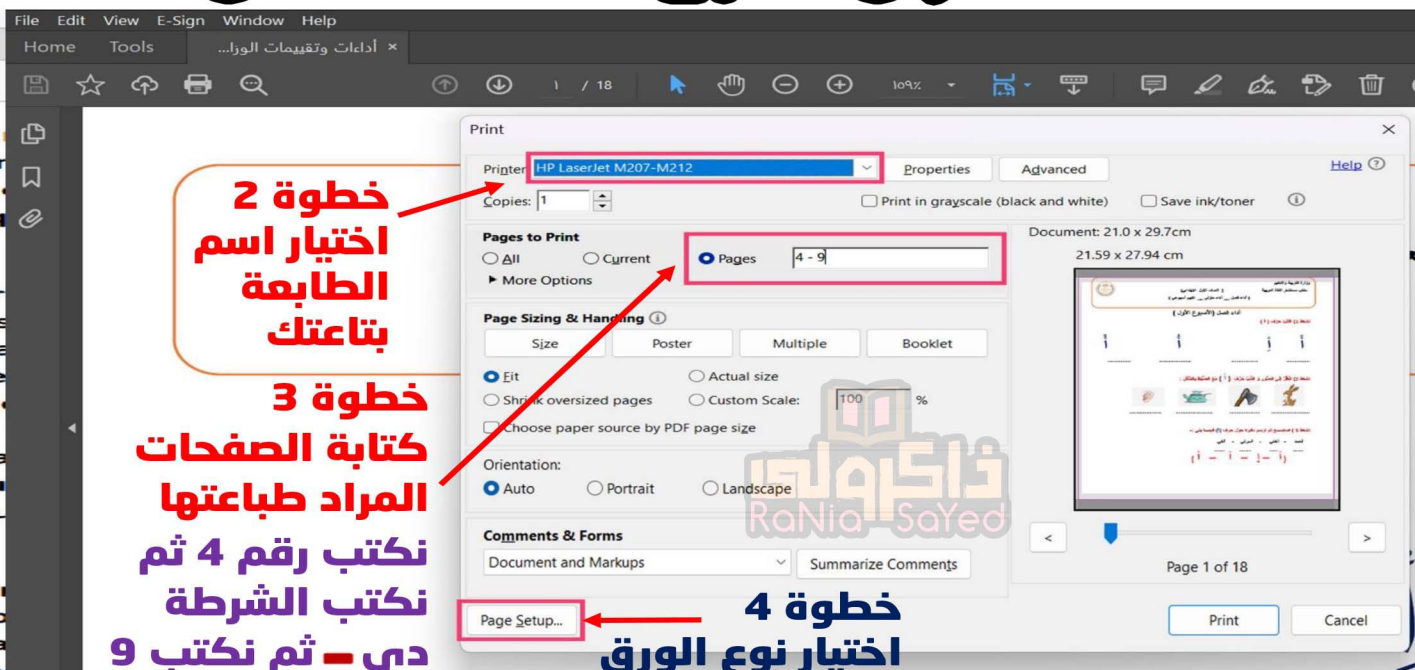
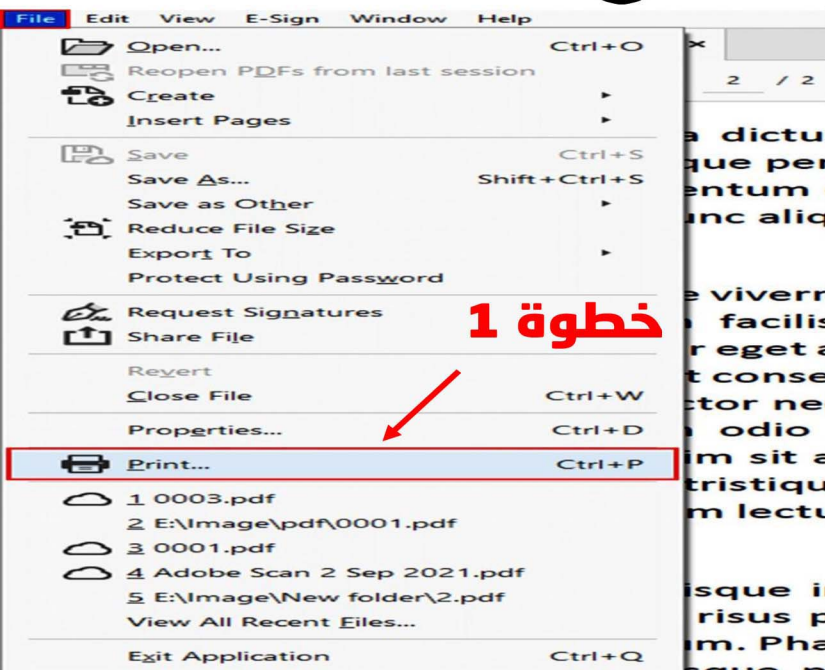
- 1 The opposite diagram represents the geological processes that occur continuously on Earth to form different types of rocks. The correct choice that accurately determines the type of the rocks is
 (a) (1) sedimentary, (2) metamorphic, (3) igneous
 (b) (1) sedimentary, (2) igneous, (3) metamorphic
 (c) (1) metamorphic, (2) igneous, (3) sedimentary
 (d) (1) igneous, (2) metamorphic, (3) sedimentary



- 2 A rock contains clear layers and grains of different sizes, we can conclude that this rock was formed as a result of
 (a) cooling of magma at Earth's surface
 (b) compression of sediments over a long period of time
 (c) minerals changing under intense heat
 (d) melting of bed rock

كيفية طباعة صفحات معينة من ملف معين

مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9



حمل الآن

مجاناً وحصرياً

المراجعة رقم (2)

اختبار شهر ابريل



Model (A)

Choose the correct answer:

- 1) During depolarization, charges are reversed because :
 - a) Negative proteins move exit the cell
 - b) The nucleus stops its activity
 - c) The Sodium pump stops working completely
 - d) positive Na^+ move in exceeds move out K^+
- 2) The "mechanical Factor" responsible for moving vesicles toward the pre-synaptic membrane is :
 - a) Sodium ions
 - b) Calcium ions
 - c) Specific enzymes
 - d) Dendrites
- 3) The complexity of brain functions compared to the spinal cord is due to the cells such as:
 - a) Sensory cells only
 - b) Long, unbranching axons
 - c) Purkinje cells with massive synapses
 - d) Surface calcium receptors
- 4) performing the NCV (Nerve Conduction Velocity) test in a "non-invasively" manner (over the skin) makes it
 - a) Safe and easy for assessing nerve functions
 - b) Inaccurate
 - c) Limited to the brain only
 - d) Requiring general anesthesia

Essay Question

5- What happens when there is a defect in the dendrites of a particular neuron?
it will not able to recieve signals from other nerves

Model (B)

Choose the correct answer:

1) The "Repolarization" phase shows the outer surface returning to a positive state due to :

- a) Stopping Sodium input and opening Potassium channels for output
- b) More Sodium input
- c) Rupture of Synaptic vesicles
- d) Movement of the nucleus within the cell body

2) The ion channels that open *first* when a sufficient stimulus arrives are :

- a) Potassium channels
- b) Calcium channels
- c) Sodium channels
- d) Chloride channels

3) The presence of "receptors" only on the post-synaptic membrane explains :

- a) The strength of the nerve impulse
- b) The transmission of the impulse in one direction
- c) The large size of the synaptic cleft
- d) The breakdown of acetylcholine

4) If an NCV (Nerve Conduction Velocity) test shows extreme slowness in signal transmission, the physician may conclude :

- a) An increase in Purkinje cells
- b) Superior speed in information processing
- c) A decrease in CO₂ levels
- d) Nerve disorder or damage

Essay Question

5- Explain: The nerve impulse is called an *electrochemical change*

The nerve impulse is electrical phenomena which arise from Potential difference across the cell membranes with chemical nature due to the movement of sodium and potassium ions

Model (C)Choose the correct answer

1) The basic "receptive unit" in the complex neural network is :

- a) Dendrites
- b) Axon
- c) Nerve endings
- d) Synaptic cleft

2) The difference between a regular neuron and a Purkinje cell lies in :

- a) The type of ions used
- b) The presence of a nucleus
- c) The number of neural synapses
- d) The method of impulse transmission along the axon

3) If a substance that blocks calcium channels in the nerve endings is injected, the result will be :

- a) Increased impulse speed
- b) Complete cessation of signal transmission between cells
- c) Transformation of the nerve impulse into a light signal
- d) Spontaneous rupture of synaptic vesicles

4) Recording and analyzing responses in the NCV (Nerve Conduction Velocity) test helps determine :

- a) The appropriate diet
- b) The number of remaining synaptic vesicles
- c) The extent and location of nerve injury or deformity
- d) The color of gray matter in the brain

Essay Question

5- Explain: The role of "selective permeability" during polarization state.

allow the exist of K^+ ions at a higher rate than the entry of Na^+ ions into the cell making the potential difference across the cell membranes equal approximately -70 mV

Lesson 4: Sensation and Response and Their Role in Organisms Interaction with Biosphere

Choose the correct answer

1- The basic structural units of the nervous system are called :

- A) Neurons
- B) Peripheral nerves
- C) Nephrons
- D) Cerebral lobes

2- The binding of a neurotransmitter to receptors leads to

- A) Closing Sodium channels in the post-synaptic cell
- B) Constriction of the synaptic knob
- C) Generating a new nerve impulse in the post-synaptic cell
- D) Return of the impulse to the pre-synaptic cell

3- Calcium ions in the synaptic area act as :

- A) A Chemical neurotransmitter
- B) An insulating material for the synaptic cleft
- C) An enzyme to break down acetylcholine
- D) A substance that release chemical transmitters from vesicles

4- The nerve impulse travels along the axon through :

- A) Continuous electrical flow
- B) A successive series of depolarization and repolarization processes
- C) Movement of vesicles inside the axon
- D) Vibration of the sheath surrounding the axon

5- What is the correct ratio of ion exchange across the Sodium-Potassium pump per ATP molecule?

- A) 3 Sodium ions out versus 2 Potassium ions in
- B) 2 Sodium ions out versus 3 Potassium ions in
- C) 1 Sodium ion out versus 1 Potassium ion in
- D) 3 Potassium ions out versus 2 Sodium ions in

- 6- The primary function of the enzyme that breaks down acetylcholine is :
- A) Stimulating the cell B) Transporting Sodium
- C) Returning the cell to the resting state**
- D) Synthesizing acetylcholine
- 7 - Which of the following represents the state of polarization?
- A) High permeability of Sodium into the cell
- B) Opening of Calcium channels
- C) Accumulation of positive charges outside the membrane and negative charges inside**
- D) Constriction of synaptic vesicles
- 8- The nerve impulse is transmitted across the synaptic cleft by :
- A) Active transport of Sodium B) Water movement between the two cells
- C) Direct electrical jumping **D) Chemical substances**
- 9- The potential difference reaching (+40 mV) means that :
- A) The cell lost its ability to sense
- B) Sodium ions have flowed inward in large quantities**
- C) The enzyme that breaks down acetylcholine has started working
- D) The cell is in a state of complete rest
- 10- Chemical neurotransmitters are stored inside :
- A) Receptors **B) Vesicles**
- C) Mitochondria D) Sodium channels
- 11- The minute space separating two neurons is called
- A) Nerve axon B) Synaptic knob
- C) Synaptic vesicles **D) Synaptic cleft**
- 12- During the refractory period, Sodium channels are:
- A) Unable to respond to a new stimulus** B) Completely open
- C) Pumping Potassium D) Disappeared
- 13- Electrical impulses in the NCV (Nerve Conduction Velocity) test resemble :
- A) Heartbeats B) The breathing process
- C) The natural nerve impulse inside the body** D) Blood flow in the veins

Essay Questions

1- Explain: Dendrites contribute to increasing the efficiency of data reception.

They increase the surface area exposing to receive the signals from other cells



2- Clarify the role of nerve endings in converting the electrical signal into a chemical communication language.

When the nerve impulse arrives at the end of the axon, a number of special calcium ion (Ca^{+2}) channels open, allowing (Ca^{+2}) ions to pass into the synaptic knob. The entry of (Ca^{+2}) ions leads to the release of neurotransmitters into the synaptic cleft. The neurotransmitters diffuse across the cleft and bind to specific receptors on the next cell. This opens the sodium and potassium ion channels in its membrane, generating a new nerve impulse.

3- Explain: Sodium ions are considered the key to starting the nerve signal.

When the nerve cell receives sufficient stimulus to excite it, special channels in the neuronal membrane open, allowing Sodium ions (Na^{+}) to move in at a rapid rate. The potential inside the cell becomes positive. The potential difference across the cell membrane reaches approximately (+40 mV)

4- What happens if :Receptors are absent in the post-synaptic membrane.

The neurotransmitters don't bind to this cell causing stop to the nerve impulse transmission

Choose the correct answer



- 1- "Nanocomposites" are an example of materials
 - A) (1) D
 - B) (2) D
 - C) (3) D
 - D) (0) D
- 2- Which type of nanomaterials is best suited for manufacturing "micro- filters "for water
 - A) 3D porous nanomaterials
 - B) 0D nanomaterials
 - C) 2D thin films
 - D) Quantum dots
- 3- "Nano chemistry" is concerned with studying changes in properties at a small scale. Which of the following falls within its interests?
 - A) Manufacturing massive devices
 - B) Studying planetary motion
 - C) Uranium decay
 - D) Manufacturing and describing nanomaterials in their various forms
- 4- If the number of atoms exposed for reaction on the surface of a nanomaterial increases, this leads to
 - A) chemical inactivity
 - B) a massive increase in chemical activity
 - C) transformation of matter into gas
 - D) increase in melting point
- 5- The primary benefit of enclosing a cancer drug with nanoparticles is
 - A) increasing the drug's size for easier swallowing
 - B) changing the drug's taste
 - C) reducing effectiveness for safety
 - D) targeting cancerous cells only



- 6- Which of the following materials is most effective for creating a nanobridge between the two ends of a severed nerve?
- A) Quantum dots B) Flat graphene
C) Carbon nanotubes D) Water molecule
- 7- The movement of smart prosthetics limbs depends on
- A) Nano-chip commands
B) large external batteries
C) wind movement
D) automatic muscle response
- 8- The primary fuel used in biofuel cells is
- A) Gasoline B) External hydrogen gas
C) Glucose D) Nano coal
- 9- Thin films appear as examples of.....materials
- A) One-dimensional Nanomaterials
B) Three-dimensional Nanomaterials
C) Zero-dimensional Nanomaterials
D) Two-dimensional Nanomaterials
- 10- Electrons in a biofuel cell move through an external circuit toward the
- A) Cathode B) Anode
C) Human body D) Ground
- 11- The role of "carbon nanotubes" in biofuel cells is
- A) storing glucose B) coating the electrodes to increase surface area
C) preventing protons from reaching the cathode
D) cooling the medical device
- 12- Which of the following organelles in a living cell performs a function similar of the positive electrode in consuming oxygen and protons to produce water?
- A) Mitochondria B) Vacuole
C) Nucleus D) Cell wall
- 13- Why are biofuel cells considered safe and clean implantable medical devices?
- A) Because they only work in the dark B) Because they are made of plastic
C) Because they use glucose as an energy source
D) Because they do not release any thermal energy



Essay

1- Explain: why traditional cancer treatments are called a double-edged sword.

Because They killed cancerous cells but caused severe side effects throughout the body

2- Explain: Nanomaterials have a higher capacity for chemical interaction.

Because when particles size decreases, The active surface..... area compared to Their volume increases, so the ability to react increases.

3- Explain the operating principle of Neural Nano-electrodes.

Nano materials work to transmit neural signals between damaged neurons.. Just as nerve impulses traveling healthy nerve, where when carbon nanotubes or nano wires are placed between the two ends of a severed nerves these parts form an anabrige that allows electrical nerve pulses to pass from one end to the other

4- Explain how nanotechnology can improve the efficiency of biofuel cells.

Nanoparticles such as gold nanoparticles or carbon nanotubes are used to coat the electrodes inside the cell, where they act as electrical catalysts, which facilitate and enhance the efficiency of electron transfer and accelerate reactions in the same way enzymes accelerate cellular respiration reactions inside mitochondria



Lesson Five: Nanotechnology Applications and Biosphere Sustainability

Model (A)



Choose the correct answer:

- 1) Which of the following represents the most accurate explanation of the term "Nanotechnology"?
 - a) The study of dwarfs in ancient Greek times
 - b) The practical application of knowledge to control materials at the nanoscale
 - c) Measuring the lengths of materials using the traditional meter
 - d) The study of large molecules in their normal state
- 2) Which of the following properties does not typically change when matter is reduced to the nanoscale?
 - a) Electrical conductivity
 - b) Color
 - c) Melting point
 - d) Atomic mass of the element itself
- 3) "Nano-chips" implanted in the brain allow paralyzed patients to
 - a) walk by relying on their damaged muscles
 - b) see distant objects
 - c) Treat bone fractures
 - d) communicate via devices merely by thinking
- 4) The operating principle of Biofuel Cells is inspired by
 - a) wood combustion
 - b) wave movement
 - c) cellular respiration
 - d) solar energy

Essay Question

5- Explain the role of "blood glucose" and the sustainability of implanted medical devices.

glucose is oxidized within mitochondria in the presence of oxygen to produce energy molecules (ATP) used by cells in their various activities. scientist use this idea to design devices that generate clean and safe energy , which can power implanted medical devices inside the body by using glucose present in the blood as an energy source



Lesson Five: Nanotechnology Applications and Biosphere Sustainability

Model (B)



Choose the correct answer:

- 1) Why is nanotechnology considered a revolution in human interaction with the biosphere?
 - a) Because it increases the size of cells to be seen by the naked eye
 - b) Because it eliminates the need to study traditional chemistry
 - c) Because it relies only on radiation for treatment
 - d) Due to its ability to observe and control matter at the level of atoms and molecules
- 2) The change in material properties at the nanoscale is due to two main factors, which are
 - a) color and hardness
 - b) increase in the ratio of surface area to volume and quantum effects
 - c) melting point and electrical conductivity
 - d) atomic size and electron speed
- 3) Neural Nano-electrodes are used for
 - a) brainwashing
 - b) cooling the Skull
 - c) recording neural signals and transmitting them to smart prosthetics limbs
 - d) increasing reading speed
- 4) The use of Nano-Gold in biofuel cells aims to
 - a) act as an electrical catalyst
 - b) prevent corrosion only
 - c) produce red light
 - d) make the device expensive

Essay Question

5- Explain: The classification of Quantum Dots based on their dimensions.

Because all dimensions of this material (length-width - height) are on the nanoscale

Lesson Five: Nanotechnology Applications and Biosphere Sustainability



Model (C)

Choose the correct answer

- 1) What is the result of one nanometer being one hundred thousand times smaller than the diameter of a human hair?
 - a) Inability to use it in medical applications
 - b) increase in the weight of materials when converted to the nanoscale
 - c) Nanomaterials possess unique properties not found in their normal states
 - d) Easy of seeing nanomaterials with a regular light microscope
- 2) Which of the following materials can be used as thin films?
 - a) Graphene
 - b) Gold nanoparticles
 - c) Porous materials
 - d) Nanowires
- 3) Carbon nanotubes are used in nerve treatment because they
 - a) kill bacteria in the nerve
 - b) transmit signals across the damaged area
 - c) give the nerve a distinctive color
 - d) reduce the nerve temperature
- 4) In a biofuel cell, glucose is oxidized at
 - a) the positive electrode (cathode)
 - b) inside the wires only
 - c) in the light lamp
 - d) negative electrode (anode)

Essay Question

5- Explain: The increase in hardness of Nano-copper compared to ordinary copper.

due to two main factors which are increase in the surface area to volume ratio, Quantum effects (when the dimensions of a particle become comparable to the wavelengths associated with electron motion, Aphenomenon know as quantum effects appears, causing thematerial to behave in entirely new ways

Model (A)

Choose the correct answer:

- 1) Which of Earth's layers accounts for only 1% of the planet's total volume?
 - a) Mantle
 - b) Core
 - c) Crust
 - d) Lithosphere
- 2) The phenomenon of "Water Hardness" results from an increased concentration of which ions?
 - a) Sodium and Potassium
 - b) Calcium and Magnesium
 - c) Iron and Nickel
 - d) Carbonates and Bicarbonates
- 3) How does the lithosphere contribute to mitigating the phenomenon of Global Warming?
 - a) By releasing volcanic gases
 - b) By absorbing oxygen
 - c) By increasing atmospheric humidity
 - d) By conversing CO₂ into bicarbonates
- 4) What is the driving force behind the movement of the tectonic plates above the asthenosphere?
 - a) Convection currents
 - b) Gravity of the moon and the sun
 - c) Strong winds
 - d) Pressure resulting from the weight of ocean waters



DR. BEDOOR
Shehab

These rocks act as natural filters capable of trapping impurities and heavy metals within their fine pores. These rocks have demonstrated their effectiveness in modern purification facilities across Europe and Asia,

Essay Question

5- How do porous volcanic rocks (such as Zeolites) function as a sustainable technological solution for water-related issues, where they have helped improve drinking water quality without the need for excessive chemicals.

Model (B)

Choose the correct answer:

1) What is the primary constituent of the oceanic crust known as "Sima"?

- a) Silica and Aluminum
- b) Silica and Magnesium**
- c) Iron and Nickel
- d) Granitic rocks



2) The interaction of rainwater charged with CO_2 with calcite rocks leads to the formation of ...

- | | |
|------------------------------|-----------------------|
| a) Caves and cavities | b) Volcanic mountains |
| c) Igneous rocks | d) Continental crust |

3) What is the primary reason continents rise above sea level compared to the oceanic crust?

- a) Because the surface area of continents is larger than oceans
- b) Because continental rocks are harder
- c) Because the density of continental crust rocks is lower than that of oceanic rocks**
- d) Due to ice accumulation on continental mountain peaks

4) The African Rift is an example of

- a) Convergent movement
- b) Transform movement
- c) Stability of the Lithosphere
- d) Divergent movement**

Essay Question

5- Explain: Silicate rocks (such as quartz) are considered more resistant to weathering than limestone. Minerals with ionic bonds, such as Calcium carbonate (CaCO_3) found in limestone, break down easily in water, especially if the water contains Carbon dioxide, which converts it into an acidic solution. In contrast, minerals with covalent bonds, such as Silica (SiO_2) in quartz, dissolve very slowly

Model (C)

Choose the correct answer

- 1) The semi-molten rocks region of the upper mantle that allows for plate movement is called the
 - a) Mesosphere
 - b) Asthenosphere
 - c) Sial
 - d) Outer Core
- 2) Which of the following minerals decomposes to release potassium ions (K^+) essential for plants?
 - a) Calcite
 - b) Phosphate
 - c) Feldspar
 - d) Quartz
- 3) Why does the inner core remain solid despite extreme temperatures?
 - a) Due to sudden cooling
 - b) Because it contains nickel
 - c) Because of its far distance from the surface
 - d) Due to immense pressure
- 4) Which of the following elements contributes to making the oceanic crust denser than the continental crust
 - a) Magnesium and Iron
 - b) Aluminum and Silica
 - c) Sodium and Potassium
 - d) Hydrogen and Helium

Essay Question

When rocks in lithosphere are exposed to weathering factors, their minerals begin to decompose gradually. This process transforms into a "natural production line" for the nutrients that plants need. For example,

5- Explain: Why is the chemical weathering of rocks considering a "natural production line" for the sustainment of life?

Phosphate rock which release Phosphate ions into the soil, which is the form that plant roots can absorb. Similarly, feldspar mineral found in granite decomposes, releasing Potassium ions (K^+), which are used for regulating the opening and closing of stomata and for energy production within plant cells

Lesson one: The Lithosphere and the Stability and Balance of Earth

Choose the correct answer

- 1- The Lithosphere consists of
 - A) The Earth's crust only
 - B) The entire mantle
 - C) The crust and the uppermost part of the mantle
 - D) The inner and outer core
- 2- The scientific term "Sial" refers to continental crust rocks rich in
 - A) Silica and Aluminium
 - B) Silica and Iron
 - C) Magnesium and Nickel
 - D) Calcium and Potassium
- 3- The largest of Earth's layers by mass (representing 67% of Earth's mass) is
 - A) The Crust
 - B) The Mantle
 - C) The Outer Core
 - D) The Inner Core
- 4- The currents responsible for tectonic plate movement originate in the
 - A) Mesosphere
 - B) Inner Core
 - C) Asthenosphere
 - D) Continental Crust
- 5- The Earth's magnetic field is generated by the movement of molten material in the
 - A) Lower Mantle
 - B) Outer Core
 - C) Oceanic Crust
 - D) Upper Mantle



6- Bicarbonate ions resulting from rock weathering eventually transform into

- A) Emitted volcanic gases
B) Concentrated acid rain
C) Calcium carbonate deposits in the seas
D) Solid silicate minerals

7 - The solubility of limestone in rainwater increases with an increase in

- A) Temperature only
B) Pressure and CO₂ concentration
C) Covalent bonds in the mineral
D) Surface wind speed



8- Which chemical bonds make a mineral most resistant to weathering (e.g., Quartz)?

- A) Ionic bonds
B) Covalent bonds
C) Metallic bonds
D) Hydrogen bonds

9- The plate movement that led to the formation of the Himalayas is

- A) Divergent
B) Transform (Sliding)
C) Convergent
D) Lateral grinding

10- The famous "San Andreas Fault" is an example of which plate movement?

- A) Continental Convergence
B) Oceanic Divergence
C) Transform (Sliding) movement
D) Destructive

11- The divergence of oceanic plates (e.g., Mid-Atlantic Ridge) leads to ...

- A) The disappearance of ancient seas
B) The formation of continental volcanic ranges
C) Increased thickness of the continental crust
D) The formation of a new ocean floor

12- The mineral "Phosphate" provides the soil with which essential ions for plant growth?

- A) Potassium ions
B) Phosphate ions
C) Calcium ions
D) Sodium ions

13- The average thickness of the Lithosphere is approximately

- A) 100 km
B) 10 km
C) 2900 km
D) 6371 km

Essay Questions

1- Compare the continental crust and oceanic crust (considering their predominant chemical composition and density).

concept	continental crust	oceanic crust
predominant chemical composition	rich in silica and aluminium and it is known as sial rocks	rich in silica and magnesium in addition to iron and it is known as sima rocks
density	It has lower density than the oceanic crust due to the nature of its rocks and chemical composition	It has higher density than the continental crust because it is rich in magnesium and iron

2- Explain: Although the speed of tectonic plates is very small, its effects are significant and visible.

The speed of tectonic plates is very small because they move above them very slowly at a rate of several centimeters per year but its effects are significant and visible as they maintain the geological balance and lead to formation of towering mountain ranges (convergent movement), cracks and fissures formation (divergent movement) and faults (Transform movement)

3- Describe (using equations or explanation) how the lithosphere helps regulate the carbon cycle and reduce atmospheric CO₂ levels.

When Silicate rocks rich in Calcium pyroxene (CaSiO₃), such as basalt and gabbro are exposed to water and Carbon dioxide, a chemical reaction occurs leading to the formation of Calcium Bicarbonate. This process contributes to reducing the percentage of Carbon dioxide in the air.

$$\text{CaSiO}_3 + 2\text{CO}_2 + 3\text{H}_2\text{O} \rightarrow \text{Ca}(\text{HCO}_3)_2 + \text{H}_4\text{SiO}_4$$
 When Carbon dioxide (CO₂) dissolved in rainwater reacts with the rocks of lithosphere, part of it is converted into bicarbonate ions (HCO₃⁻). These ions dissolve in water and carry Carbon away from the atmosphere. These ions are transported via rivers to the seas, where they may later be deposited as solid Calcium Carbonate (CaCO₃).

4- Explain: Convergent movement contributes to the formation of towering mountain ranges.

Because it occurs when two plates move toward each other leading to their collision resulting in compression and rise of rocks forming towering mountain ranges



**Lesson Two(Part 1): Materials Composing Lithosphere
and Their Role in Earth's Stability and Continuity**

Model (A)

Choose the correct answer:



- 1) Which of the following physical properties expresses the degree of resistance of a mineral to scratching?
 - a) Luster
 - b) Cleavage
 - c) Hardness
 - d) Specific Gravity
- 2) If you have a sample of Calcite (Hardness 3), which tool can scratch it according to field hardness tests?
 - a) Fingernail
 - b) Copper coin
 - c) Gypsum piece
 - d) Iron nail
- 3) Why is Granite preferred for flooring in high-traffic areas like stations and hospitals instead of Limestone?
 - a) Because Granite has an attractive glassy luster
 - b) Due to Granite's high hardness and resistance to erosion
 - c) Because Granite exhibits cleavage in one direction
 - d) Due to Granite's low specific gravity, making it easier to transport
- 4) Which of the following minerals exhibits perfect cleavage in one direction, allowing it to separate into thin sheets?
 - a) Mica
 - b) Quartz
 - c) Chert
 - d) Feldspar

Essay Question

5- Cleavage is a property that must be studied accurately when selecting rocks for construction." Discuss this statement, explaining the engineering risks that may arise from neglecting this property.

Using rocks that contain minerals with clear cleavage in the construction of quarry walls or building sites may lead to splitting them into layers or breaking apart when exposed to mechanical stress, increasing the probability of collapse or slides.

Choose the correct answer:

1) what is the scientific term for the extent of light reflection from a mineral's surface?

- a) Luster
- b) Streak
- c) Hardness
- d) Fracture



2) A student tried to scratch a rock sample with its fingernail and failed, but it was scratched by a metal coin. What is the approximate hardness of this sample?

- a) 1.2
- b) 2
- c) 2.8
- d) 5

3) Although the similarity in color and luster between Gold and Pyrite, how can a geological engineer definitively distinguish between them on-field?

- a) By observing the color only
- b) By using a hardness test or measuring specific gravity
- c) By examining the cleavage in one direction
- d) By checking the transparency of the sample

4) What is the scientific explanation for the "conchoidal fracture" observed in Quartz?

- a) Presence of weak bonding planes
- b) High Lead content
- c) Exposure to atmospheric humidity
- d) Strong chemical bonds in all directions and absence of cleavage

Essay Question

5- - Explain: "Mineral color alone cannot be depended as a primary identifying characteristic." give two examples from your studied to support your answer.

as different minerals may share the same color.

The mineral pyrite and gold have yellow color and golden metallic luster
calcite and quartz have the same colour and glassy appearance

Model (C)Choose the correct answer

1) Which of the following minerals represents degree (10), the highest level of hardness on the Mohs scale?

- a) Quartz
- b) Gypsum
- c) Diamond
- d) Feldspar



2) Given that Galena is rich in Lead, which physical property distinguishes it when compared to Feldspar ?

- a) Basal cleavage.
- b) High specific gravity
- c) glassy luster
- d) Distinct green color

3) Why is the conchoidal fracture of Quartz considered evidence of strong chemical bonds in all directions within its crystal structure?

- a) Because it cleaves easily under pressure
- b) Because its color changes based on the type of impurities
- c) Because it has low hardness on the Mohs scale
- d) Because it lacks planes of weakness (cleavage), causing it to break irregularly

4) Why does the use of rocks with "clear cleavage" pose a risk in constructing quarry walls?

- a) Because they are extremely heavy
- b) Because they may split into layers and collapse under mechanical stress
- c) Because their color change over time
- d) Because they resist drilling operations

The specific gravity of a mineral is an indicator of its content of heavy or high-density elements. Minerals rich in heavy elements such as lead or silver have high specific gravities, such as the mineral Galena (lead sulfide), while lighter minerals like Feldspar have low specific gravities.

5- Essay Question
Inter the relationship between the chemical composition of minerals forming rock and their specific gravity, explaining the significance of this relationship in engineering applications .

In engineering and geological applications, the weight of rock samples is observed during examination. Iron and the minerals found in volcanic rocks give them a higher relative density than sedimentary rocks such as light sandstone. Determining the specific gravity of rocks at construction sites helps in determining the composition of the rock strata during drilling or geophysical surveying.

Lesson Two(Part 1): Materials Composing Lithosphere
and Their Role in Earth's Stability and Continuity

Choose the correct answer



- 1- The lithosphere consists of minerals that are chemically bonded to form
A) Soil
B) Rocks
C) Crystals
D) Gases
- 2- The hardness of quartz on the Mohs scale isapproximately
A) 2
B) 4
C) 7
D) 10
- 3- The statue of Sphinx of Giza was made of Limestone rock, which has a hardness of ...
A) 2 : 3
B) 3 : 4
C) 6 : 7
D) 7
- 4- The material used in making glass tools due to its resistance to scratching is ...
A) Gypsum
B) Mica
C) Calcite
D) Quartz
- 5- "Fool's Gold" is a name given to the mineral
A) pyrite
B) Malachite
C) Galena
D) Feldspar
- 6- The mineral characterized by perfect cleavage in one direction, appearing as thin sheets, is
A) Quartz
B) Mica
C) Feldspar
D) Calcite
- 7) Specific gravity is measured by comparing the mass of a volume of a mineral to the mass of the same volume of water at a temperature of
A) 0°C
B) 4°C
C) 25°C
D) 100°C

8- Which of the following rocks is most resistant to natural erosion processes?

- A) Limestone
- B) Calcite-rich rocks
- C) Gypsum
- D) Granite

9 - The mineral malachite always appears in thecolour

- A) Yellow
- B) Red
- C) Green
- D) Blue

10- The pattern that appears when a mineral breaks irregularly and does not follow cleavage planes is called

- A) Streak
- B) Fracture
- C) Luster
- D) Hardness

11- Minerals with high hardness are used in crowded areas to ensure

- A) Resistance to wear and scratching
- B) Floor shine
- C) Ease of cleaning
- D) Cost reduction

12- Which of the following minerals possesses a metallic luster?

- A) Quartz
- B) Basalt
- C) Calcite
- D) Pyrite

13- The specific gravity of the mineral galena is considered high because it ...

- A) contains silica
- B) contains the heavy element Lead
- C) has a glassy luster
- D) has high hardness

Essay Questions

1- Given an iron nail and an Alabaster sample, how can you practically prove that Alabaster is less hard?

Try to scratch an Alabaster sample(Hardness ≈ 2). with an iron nail(Hardness ≈ 4.5). The Alabaster sample is scratched by iron nail so it has lower hardness than iron nail

2- Compare glassy luster and metallic luster, providing an example for each from your study.

Luster refers to the extent of light reflection from the mineral surface
glassy is bright but allows light to pass through like quartz
while metallic is dark, opaque and resembles metal like gold

3- Explain: how studying the physical properties of minerals contributes to maintaining the stability and continuity of the lithosphere's balance.

Minerals play an important role in the Earth's stability and continuity: they impart hardness and cohesion to rocks, contribute to the formation of continents and mountains, and determine the properties of soil. Furthermore, their chemical and physical diversity allows for a different distribution of elements within the Earth's crust, which supports natural processes like the rock cycle and Tectonic plates.

4- All that glitters is not gold." Apply this saying scientifically to Gold and Pyrite, explaining the fundamental differences between them.

The mineral pyrite is known as "fool's gold" because it displays a golden..... metallic luster, but it differs from real gold in composition and density.

Shehab

Lesson Two(Part 2): Materials Composing Lithosphere and Their Role in Earth's Stability and Continuity

Choose the correct answer

- 1- The mineral group that "dominates" the composition of most of the Earth's crust is
 A) Oxides
 B) Silicates
 C) Sulfides
 D) Carbonates
- 2- Adjusting electronic signals" in mobile phones functionally depends on the mineral
 A) Quartz
 B) Iron
 C) Gold
 D) Cobalt
- 3- The element iron is used in the manufacture of "electric cars" to achieve the goal of
 A) increasing weight
 B) reducing speed
 C) sustainability and reducing pollution
 D) changing the shape of roads
- 4- Which of the following represents an application of the "electrical oscillation" of minerals?
 A) High-speed train
 B) Wind turbines
 C) Lithium batteries
 D) GPS devices
- 5- Imaging internal body organs with extreme clarity and high precision without surgical intervention is a description of the function of
 A) Traditional X-rays
 B) Sonar
 C) Magnetic Resonance Imaging (MRI)
 D) Electronic Microscope
- 6- The main component of "electronic chips" is
 A) Silicon
 B) Plastic
 C) Feldspar
 D) Iron

7- Sediments transform into "sedimentary rocks" as a result of

- A) Fragmentation by weathering B) Their accumulation and pressure over time
C) Exposure to extreme cold D) Boiling in the seas

8 - The glass we use daily depends in its manufacture on

- A) cooling of magma B) pressure of limestone
C) melting of marble D) Sands

9- The "movement of tectonic plates" leads to pushing rocks to great depths, causing

- A) formation of surface sand B) rainfall
C) The start of the transformation process D) freezing of rocks

10- Lava on the surface" upon cooling gives rocks

- A) Stratified sedimentary B) Igneous
C) Pressure-metamorphic D) Fine sand

11- Silicon extracted from sand is considered the basis of "processors and electronic circuits" because it

- A) is a semiconductor that controls the flow of current
B) is very hard
C) is green in color D) is never melts

12- The mineral called the "oil of the twenty-first century" is

- A) Quartz B) Titanium
C) Calcite D) Lithium

13- Egypt's "Heading to Future" project primarily aims to

- A) extract gold from mountains
B) enhance strategic connectivity and support export ports
C) build new pyramids
D) increase desert area

Essay Questions



1- Explain chemically why limestone rocks are more susceptible to chemical weathering compared to silicate rock.

calcite, which is found in limestone and is composed of calcium carbonate (CaCO_3), partially dissolves in weak acids, such as dilute carbonic acid minerals while silicate group, such as feldspar and quartz, they have a resistance to dissolving in weak acids, which is why soil and rock sediments retain the minerals feldspar and quartz for long periods of time

2- Infer the environmental role of iron in the modern transportation industry.

has become an essential element in modern technology and renewable energy as it is used for manufacturing electric cars and high-speed trains, which contributes to reducing Carbon emissions and achieving a more sustainable future.

3- Explain: Titanium is considered the first choice in bone implant surgeries. due to its amazing ability to integrate with the body's tissues without being rejected by the immune system, in addition to its great strength despite its light weight.

4- Explain: The lithosphere represents a "natural reservoir" that ensures technological development.

lithosphere represents a natural reservoir rich in mineral resources whose importance is not limited to shaping the Earth's surface but extends beyond that to become an essential part of the industrial, technological, and medical development in the world.

Model (A)**Choose the correct answer:**

- 1) Which of the following minerals has an atomic structure that makes it more resistant to "acid rain" rich in dilute carbonic acid?
 - a) Calcite
 - b) Quartz
 - c) Hematite
 - d) Magnetite
- 2) The "High-Speed Electric Train" contributes to achieving a more sustainable future by
 - a) increasing fuel consumption
 - b) using coal as an energy source
 - c) relying on non-renewable energy sources
 - d) reducing carbon emissions
- 3) Calcium and Iron" compounds are used in the medical field as
 - a) Surgical scalpels
 - b) Anesthetics
 - c) Nutritional supplements
 - d) Equipment cleaners
- 4) The "Rock Cycle" often begins with
 - a) Igneous rocks
 - b) Sedimentary rocks
 - c) Metamorphic rocks
 - d) Fine sands

**Essay Question**

5- Explain: The importance of "sand" as a strategic element in modern technology. Silicon is an element extracted from sand, considered one of the most important materials that has transformed modern life. It is the main component in the manufacture of electronic chips (microchips) inside computers and smartphones. Silicon is distinguished by its ability to control the flow of electric current in electronic circuits, which makes it the basis for the operation of processors and electronic circuits. It is also used in the production of solar panels that convert sunlight into clean electrical energy.

Model (C)**Choose the correct answer**

- 1) Which of the following is "NOT" among the requirements for defining a mineral geologically?
- a) Organic substance b) Regular crystalline structure
c) Naturally occurring solid substance
d) Definite chemical composition
- 2) Which of the following technological industries would be completely "disrupted" if quartz were lost?
- a) Iron and steel industry b) Building wind turbines
c) Artificial joint implants d) Global Positioning System (GPS)
- 3) An element that plays a pivotal role in the manufacture of smart "lithium-ion batteries" is
- a) Gold b) Silver
c) Cobalt d) Magnesium
- 4) Which of the following processes is responsible for transforming "igneous rocks" into sediments?
- a) Crystallization
b) Erosion and transport
c) Melting
d) Pressure and heat

Essay Question

5- Explain: "Silicon" contributes to reducing reliance on fossil fuels .

"Silicon is considered the primary component in the manufacturing of solar panels, which function by converting sunlight directly into clean electrical energy. This provides a renewable energy source, thereby reducing the need for electricity generation through the burning of fossil fuels.

حمل الآن

مجاناً وحصرياً

المراجعة رقم (3)

اختبار شهر ابريل



الدرس - الرابع -

First : Choose the correct answer :

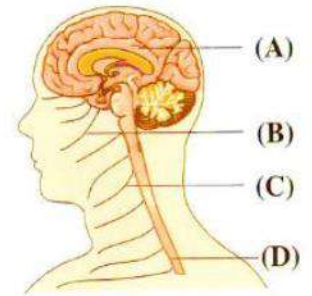
1. Which of the following accurately expresses the function performed by the nervous system?....

- a. ☐ Recognizing the external environment stimuli and transmitting them to the internal environment.
- b. ☐ Converting electrical stimuli into chemical signals.
- c. ☐ Responding to stimuli voluntarily only
- d. ☐ Processing stimuli and transmitting them to generate responses.

2. In the opposite figure :

What are the parts that represent the central nervous system?.....

- a. ☐ (A) and (C)
- b. ☐ (A) and (C)
- c. ☐ (A) and (D)
- d. ☐ (A) and (D)



3. Which of the following choices is applied to the peripheral and central nervous systems?.....

- a. ☐ The peripheral system is a part of the central system
- b. ☐ The central system is a part of the peripheral system
- c. ☐ The peripheral system joins the central system by the other organs
- d. ☐ The central system joins the peripheral system by the other organs

4. The basic "structural units" of the nervous system are called.....

- a. ☐ neurons
- b. ☐ nephrons
- c. ☐ peripheral nerves
- d. ☐ cerebral lobes

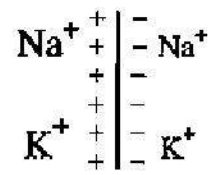
5. The nerve cell is considered the fundamental unit in the formation of the nervous system, and its basic function is.....

- a. ☐ hormone production
- b. ☐ energy storage
- c. ☐ nerve impulse transmission
- d. ☐ body defense

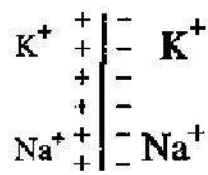
16. Which of the following expresses the concentration of ions outside the nerve cell membrane at rest?.....

- a. ☐ High for each of sodium and potassium
- b. ☐ Low for each of sodium and potassium
- c. ☐ High for sodium and low for potassium
- d. ☐ Low for sodium and high for potassium

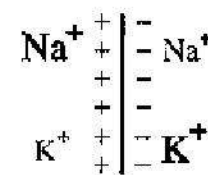
17. If the large-sized symbol of ion expresses the higher concentration, while the small-sized symbol of ion expresses the lower concentration. Which of the following figures represents the membrane of nerve fiber at rest state?.....



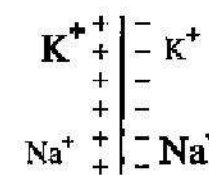
(a)



(b)



(c)



(d)

18. By analyzing the values that recorded in the opposite table that represent the concentrations of three different elements

	Inside the nerve cell membrane	Outside the nerve cell membrane
X	15 mM	145 mM
Z	150 mM	5 mM

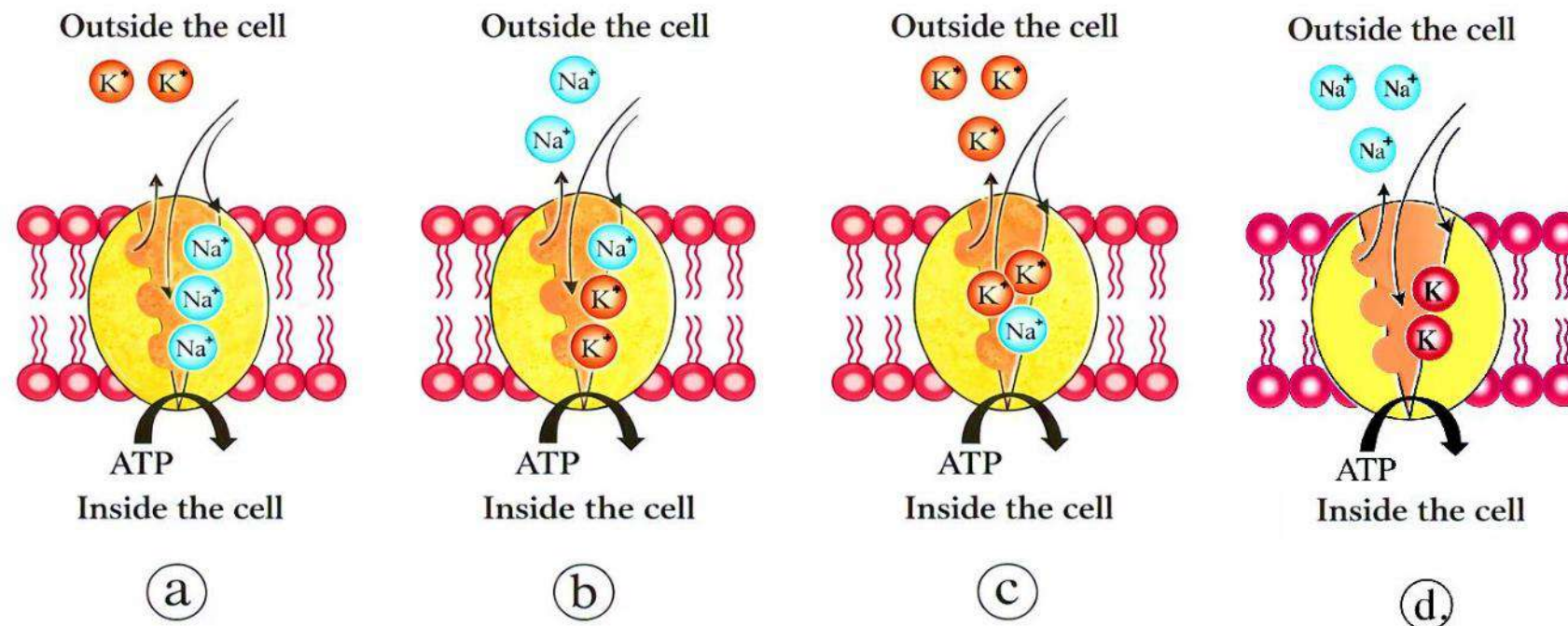
What would the ions X and Z represent, respectively? (at the rest state)

- a. ☐ Sodium - chloride
- b. ☐ Chloride - sodium
- c. ☐ Potassium - sodium
- d. ☐ Sodium - potassium

19. Which of the following leads to the resting potential of a neuron?.....

- a. ☐ The equal distribution of ions inside and outside the cell
- b. ☐ The membrane selective permeability to ions
- c. ☐ The outflow of chloride ions
- d. ☐ The increase in sodium ions permeability to inside

20. Which of the following figures represents the action of sodium-potassium pump?.....



21. Which of the following statements explains why the sodium-potassium pump requires energy?.....

- a. ☐ As it moves ions down the concentration gradient
- b. ☐ As it moves ions against concentration gradient
- c. ☐ As it does not depend on ATP
- d. ☐ As it only works during sleep

22. What is the correct ratio of ion exchange across the sodium-potassium pump per ATP molecule?.....

- a. ☐ 3 sodium ions out versus 2 potassium ions in
- b. ☐ 2 sodium ions out versus 3 potassium ions in
- c. ☐ 1 sodium ion out versus 1 potassium ion in
- d. ☐ 3 potassium ions out versus 2 sodium ions in

23. During depolarization, charges are reversed because.....

- a. ☐ negative proteins move exit the cell
- b. ☐ the nucleus stops its activity
- c. ☐ the sodium pump stops working completely
- d. ☐ positive Na⁺ move in exceeds move out

24. The ion channels that open first when a sufficient stimulus arrives are.....

- a. ☐ potassium channels
- b. ☐ sodium channels
- c. ☐ calcium channels
- d. ☐ chloride channels

42. **What is the main function of neurotransmitters in the synapse?.....**

- a. ☐ Storing energy
- b. ☐ Breaking down ions
- c. ☐ Transmitting the signal between two cells
- d. ☐ Increasing axon speed

43. **The minute space separating two neurons is called.....**

- a. ☐ nerve axon
- b. ☐ synaptic vesicles
- c. ☐ synaptic knob
- d. ☐ synaptic cleft

44. **The "mechanical factor" responsible for moving vesicles toward the pre- synaptic membrane is.....**

- a. ☐ sodium ions
- b. ☐ specific enzymes
- c. ☐ calcium ions
- d. ☐ dendrites

45. **Which of the following occurs immediately after the nerve impulse reaches the terminal knobs (buttons)?...**

- a. ☐ Calcium exits the cell
- b. ☐ Calcium enters and vesicles fuse with the membrane
- c. ☐ Sodium channels close
- d. ☐ Neurotransmitter breakdown

46. **Calcium ions in the synaptic area act as.....**

- a. ☐ a chemical neurotransmitter
- b. ☐ an insulating material for the synaptic cleft
- c. ☐ an enzyme to break down acetylcholine
- d. ☐ a substance that releases chemical transmitters from vesicles

47. **If a substance that blocks the calcium channels in the nerve endings is injected, the result will be.....**

- a. ☐ increased impulse speed
- b. ☐ complete cessation of signal transmission between cells
- c. ☐ transformation of the nerve impulse into a light signal
- d. ☐ spontaneous rupture of synaptic vesicles

56. **Electrical impulses in the NCV (Nerve Conduction Velocity) test resemble.....**
- a. ☐ heartbeats
 - b. ☐ the breathing process
 - c. ☐ the natural nerve impulse inside the body
 - d. ☐ blood flow in the veins
57. **If an NCV (Nerve Conduction Velocity) test shows extreme slowness in signal transmission, the physician may conclude.....**
- a. ☐ an increase in Purkinje cells
 - b. ☐ superior speed in information processing
 - c. ☐ a decrease in CO₂ levels
 - d. ☐ nerve disorder or damage
58. **Recording and analyzing responses in the NCV (Nerve Conduction Velocity) test helps determine.....**
- a. ☐ the appropriate diet
 - b. ☐ the number of remaining synaptic vesicles
 - c. ☐ the extent and location of nerve injury or deformity
 - d. ☐ the color of gray matter in the brain
59. **Which of the following isn't a purpose for the Nerve Conduction Velocity (NCV) test?.....**
- a. ☐ Assessing the nerve damage
 - b. ☐ Detecting the nerve-related disorders
 - c. ☐ Determining the extent and location of nerve injuries or deformities
 - d. ☐ Increasing the rate of impulse speed in nerves
60. **Performing the NCV (Nerve Conduction Velocity) test in a "non-invasively" manner (over the skin) makes it**
- a. ☐ safe and easy for assessing nerve functions
 - b. ☐ inaccurate
 - c. ☐ limited to the brain only
 - d. ☐ requiring general anesthesia

8. Clarify the role of nerve endings in converting the electrical signal into a chemical communication language

.....

.....

9. The presence of a synaptic cleft between two nerve cells is essential despite its extremely small size?

.....

.....

10. The nerve impulse is called an electrochemical change?

.....

.....

What happens if ?

1. There is a defect in the dendrites of a particular neuron?

.....

.....

2. Receptors are absent in the post-synaptic membrane?

.....

.....

THANK YOU

الدرس - الخامس -

First : Choose the correct answer :

1. **Why is nanotechnology considered a revolution in human interaction with the biosphere?.....**
 - a. ☐ Because it increases the size of cells to be seen by the naked eye
 - b. ☐ Because it eliminates the need to study traditional chemistry
 - c. ☐ Because it relies only on radiation for treatment
 - d. ☐ Due to its ability to observe and control matter at the level of atoms and molecules
2. **Which of the following represents the most accurate explanation of the term "Nanotechnology"?.....**
 - a. ☐ The study of dwarfs in ancient Greek times
 - b. ☐ The practical application of knowledge to control materials at the nanoscale
 - c. ☐ Measuring the distance between two points
 - d. ☐ The study of large molecules in their normal state
3. **What does the word "Nano" mean in Greek?.....**

a. ☐ Huge	b. ☐ Unique	c. ☐ Dwarf	d. ☐ Perfect
-------------------------------	---------------------------------	--------------------------------	----------------------------------
4. **One meter is equivalent to**

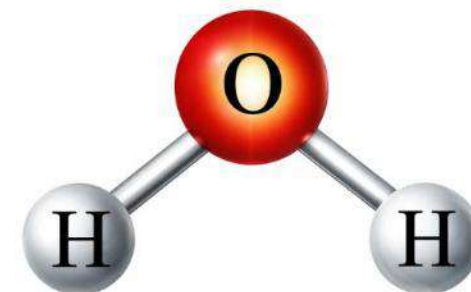
a. ☐ 10^9 nm	b. ☐ 10^{-9} nm	c. ☐ 10^3 nm	d. ☐ 10^{-3} nm
------------------------------------	---------------------------------------	------------------------------------	---------------------------------------
5. **The diameter of a single human hair is approximately**

a. ☐ 10^3 nm	b. ☐ 10^5 nm	c. ☐ 10^{-5} nm	d. ☐ 10^9 nm
------------------------------------	------------------------------------	---------------------------------------	------------------------------------
6. **The ratio between the diameter of a sand grain and a human hair**

a. ☐ is greater than 1	c. ☐ equals 1
b. ☐ is less than 1	d. ☐ equals zero

7. **The diameter of the molecule shown in the opposite figure is approximately**

- a. ☐ 0.3 m
- b. ☐ 3 nm
- c. ☐ 3×10^{-10} m
- d. ☐ 0.3×10^{-9} nm



8. **What is the result of one nanometer being one hundred thousand times smaller than the diameter of a human hair?.....**

- a. ☐ Inability to use it in medical applications
- b. ☐ Increase in the weight of materials when converted to the nanoscale
- c. ☐ Nanomaterials possess unique properties not found in their normal states
- d. ☐ Easy of seeing nanomaterials with a regular light microscope

9. **Which of the following properties doesn't typically change when matter is reduced to the nanoscale?.....**

- | | |
|--|--|
| a. ☐ Electric conductivity | c. ☐ Melting point |
| b. ☐ Color | d. ☐ Atomic mass of the element itself |

10. **When an amount of substance is divided into particles on the nanoscale**

Which of the following properties remain constant?.....

- | | |
|--|---|
| a. ☐ Surface area and total volume | c. ☐ Solubility and electrical conductivity |
| b. ☐ Mass and total volume | d. ☐ Hardness and optical properties |

11. **The change in material properties at the nanoscale is due to two main factors, which are.....**

- a. ☐ color and hardness
- b. ☐ increase in the ratio of surface area to volume and quantum effects
- c. ☐ melting point and electrical conductivity
- d. ☐ atomic size and electron speed

22. **The hardness of copper increases at the nanoscale as a result of.....**

- a. ☐ increase in the number of electrons in its atoms
- b. ☐ convergence of molecules
- c. ☐ increase in the ratio of surface area to volume
- d. ☐ increase in the energy of the electrons in its atoms

23. **As the particle size of copper decreases, its hardness and electrical conductivity respectively.**

- a. ☐ increases / changes
- b. ☐ increases / doesn't change
- c. ☐ doesn't change / increases
- d. ☐ doesn't change / doesn't change

24. **"Nano chemistry" is concerned with studying changes in properties at a small scale**

Which of the following falls within its interests?.....

- a. ☐ Manufacturing massive devices
- b. ☐ Studying planetary motion
- c. ☐ Uranium decay
- d. ☐ Manufacturing and describing nanomaterials in their various forms

25. **A silver nanoparticle has two dimensions of 25 nm, and 30 nm.**

What is the probable third dimension of this particle?.....

- | | |
|--------------------------------|----------------------------------|
| a. ☐ 60 cm | c. ☐ 25 mm |
| b. ☐ 30 nm | d. ☐ 1000 nm |

26. **Which of these materials contain only one dimension that is not on the nanoscale?.....**

- | | |
|---|---|
| a. ☐ Gold nanoparticles | c. ☐ Carbon nanotubes |
| b. ☐ Thin films | d. ☐ Quantum dots |

33. **Nanocomposites are an example of materials**

- a. ☐ (1) D
- b. ☐ (2) D
- c. ☐ (3) D
- d. ☐ (0) D

34. **Which type of nanomaterials is best suited for manufacturing "micro-filters" for water?.....**

- a. ☐ 3D porous nanomaterials
- b. ☐ 0D nanomaterials
- c. ☐ 2D thin films
- d. ☐ Quantum dots

35. **What are the possible dimensions of the shown figure?.....**

- a. ☐ (322 nm / 83 nm / 720 nm)
- b. ☐ (179 nm / 180 nm / 11 nm)
- c. ☐ (86 nm / 94 nm / 91 nm)
- d. ☐ (196 nm / 201 nm / 278 nm)



36. **Which of the following explains the description of conventional cancer treatment as a "double-edged sword"?**

- a. ☐ It may kill infected cells or it may not
- b. ☐ It kills healthy cells and the patient's body rejects it
- c. ☐ It kills infected and uninfected cells
- d. ☐ It increases the growth rate of infected and uninfected cells

37. **Which of the following represents an application of programmed nanoparticles?.....**

- a. ☐ Cancer treatment
- b. ☐ Repairing damaged nerves
- c. ☐ Controlling prosthetic limbs
- d. ☐ Biofuel cells

38. **The primary benefit of enclosing a cancer drug with nanoparticles is.....**

- a. ☐ increasing the drug's size for easier swallowing
- b. ☐ changing the drug's taste
- c. ☐ reducing effectiveness for safety
- d. ☐ targeting cancerous cells only

51. **What is the nanostructure that enables the movement of the right arm after it has been stopped for a period of time?.....**
- a. ☐ A neural nanotech interface in the brain
 - b. ☐ A neural nanotech interface in the arm
 - c. ☐ A nanobridge in the nerve that transmits the signal to the arm
 - d. ☐ A nanobridge in the nerve that transmits the signal to the brain
52. **The operating principle of Biofuel Cells is.....**
- a. ☐ wood combustion
 - b. ☐ wave movement
 - c. ☐ cellular respiration
 - d. ☐ solar energy
53. **The function of biofuel cells is similar to the process of cellular respiration in that both.....**
- a. ☐ produce energy from the oxidation of glucose
 - b. ☐ consume ATP molecules
 - c. ☐ store energy
 - d. ☐ depend in their function on solar energy
54. **Which organelle performs a function similar to the positive electrode?.....**
- a. ☐ Mitochondria
 - b. ☐ Vacuole
 - c. ☐ Nucleus
 - d. ☐ Cell wall
55. **The primary fuel used in biofuel cells is.....**
- a. ☐ gasoline
 - b. ☐ external hydrogen gas
 - c. ☐ glucose
 - d. ☐ nano coal
56. **What is the type of energy that is produced from cellular respiration and biofuel cells, respectively?.....**
- a. ☐ Light energy - Thermal energy
 - b. ☐ Chemical energy - Electrical energy
 - c. ☐ Electrical energy - Thermal energy
 - d. ☐ Chemical energy - Light energy

Second : Essay questions :

Explain Why?

1. Materials exhibit new properties when they reach nanoscale dimensions less than 100 nm?

.....

.....

2. The rate of chemical reactions increases in nanoparticles compared to the normal size of matter?

.....

.....

3. Nanomaterials have a higher capacity for chemical interaction?

.....

.....

4. Explain: The classification of Quantum Dots based on their dimensions?

.....

.....

5. Explain: The increase in hardness of Nano-copper compared to ordinary copper?

.....

.....

6. Carbon nanotubes are used in the design of future space elevators?

.....

.....

7. Traditional cancer treatments are called a double-edged sword?

.....

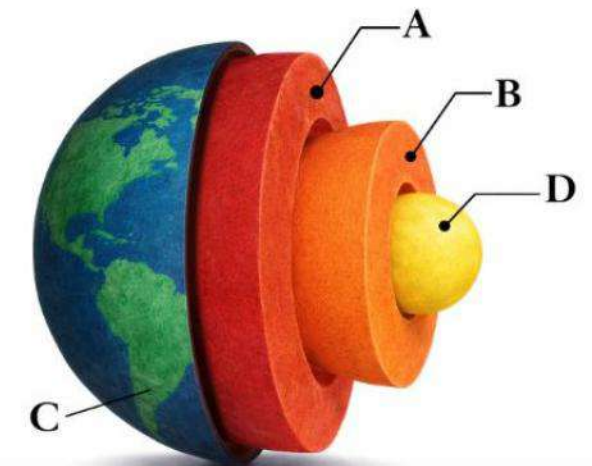
الدرس - السادس -

First : Choose the correct answer :

1. Which of Earth's layers accounts for only 1% of the planet's total volume?.....
 - a. O Mantle
 - b. O Core
 - c. O Crust
 - d. O Lithosphere
2. Continental crust rocks differ from oceanic crust rocks in all of the following, except.....
 - a. O mineral composition
 - b. O density
 - c. O thickness
 - d. O physical state
3. The scientific term "Sial" refers to continental crust rocks rich in
 - a. O silica and aluminium
 - b. O silica and iron
 - c. O magnesium and nickel
 - d. O calcium and potassium
4. What is the primary constituent of the oceanic crust known as "Sima"?.....
 - a. O Silica and Aluminum
 - b. O Silica and Magnesium
 - c. O Iron and Nickel
 - d. O Granitic rocks
5. The opposite model represents the Earth's layers.

What is the letter that refers accurately to sial rocks?.....

 - a. O A
 - b. O B
 - c. O C
 - d. O D
6. Which of the following elements contributes to making the oceanic crust denser than the continental crust?..
 - a. O Magnesium and Iron
 - b. O Aluminum and Silica
 - c. O Sodium and Potassium
 - d. O Hydrogen and Helium



26. Which of the following factors does not affect the solubility of minerals in water?.....

- a. ☐ The nature of the chemical bonds in the mineral
- b. ☐ The water temperature
- c. ☐ The pressure exerted on water
- d. ☐ The density of the mineral

27. Which chemical bonds make a mineral most easily to weathering (e.g., Calcite) forming limestone?.....

- a. ☐ Covalent bonds
- b. ☐ Metallic bonds
- c. ☐ Hydrogen bonds
- d. ☐ Ionic bonds

28. Which chemical bonds make a mineral most resistant to weathering (e.g., Quartz) forming sandstone?.....

- a. ☐ Ionic bonds
- b. ☐ Covalent bonds
- c. ☐ Metallic bonds
- d. ☐ Hydrogen bonds

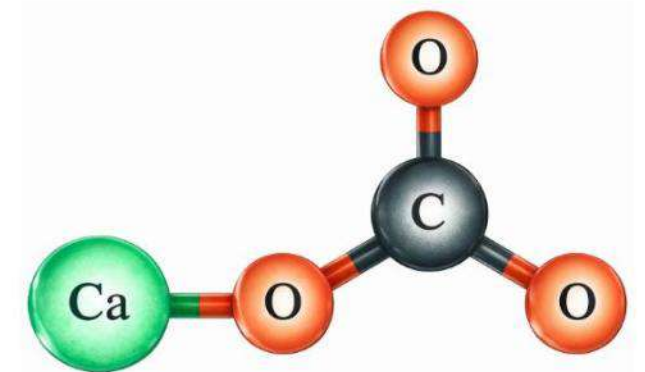
29. The opposite figure represents the molecular structure of a mineral.

This mineral differs from quartz in.....

- a. ☐ containing the oxygen element
- b. ☐ the release of carbon ions from it when it decomposes
- c. ☐ difficulty of its dissociation in water
- d. ☐ binding of its atoms by ionic bonds

30. The phenomenon shown in the opposite figure is an example for factors that affect the mineral solubility, which is

- a. ☐ groundwater containing CO_2 gas
- b. ☐ increasing the concentration of carbonate salts in water
- c. ☐ increasing the water temperature
- d. ☐ water containing the element silicon



31. Which of the following statements explains the reason for the increased solubility of some minerals in deep groundwater?.....

- a. ☐ Decreasing the pressure exerted on the water
- b. ☐ Decreasing the water temperature
- c. ☐ Reducing the solubility of the dissolved gases in water
- d. ☐ Increasing the pressure exerted on water

32. The solubility of limestone in rainwater increases with an increase in

- a. ☐ temperature only
- b. ☐ pressure and CO₂ concentration
- c. ☐ covalent bonds in the mineral
- d. ☐ surface wind speed

33. The interaction of rainwater charged with CO₂ with calcite rocks leads to the formation of ...

- a. ☐ caves and cavities
- b. ☐ volcanic mountains
- c. ☐ igneous rocks
- d. ☐ continental crust

34. If an area is found to contain thin layers of limestone with cavities and caves, this indicates that....

- a. ☐ the limestone has high hardness
- b. ☐ the limestone has undergone chemical weathering
- c. ☐ the soil in this area is poor in minerals
- d. ☐ the solubility of limestone in water is low

35. Which of the following factors most significantly affects the weathering rate of Carbonate rocks?

- a. ☐ High rock density
- b. ☐ High water salinity
- c. ☐ High concentration of CO₂ in rainwater
- d. ☐ High air temperature

36. Porous volcanic rocks (as zeolite) are used in some water treatment plants because they:.....

- a. ☐ increase the viscosity of water
- b. ☐ absorb impurities and heavy metals
- c. ☐ prevent water from passing to lithosphere depths
- d. ☐ convert water into carbonic acid

37. Which of the following reacts faster with acid rain?.....

- a. ☐ Quartz
- b. ☐ Limestone
- c. ☐ Sandstone
- d. ☐ Zeolite

50. **The plate movement that led to the formation of the Himalayas is**

- a. ☐ divergent
- b. ☐ transform (sliding)
- c. ☐ convergent
- d. ☐ lateral grinding

51. **The African Rift is an example of**

- a. ☐ convergent movement
- b. ☐ transform movement
- c. ☐ stability of the Lithosphere
- d. ☐ divergent movement

52. **The divergence of oceanic plates (e.g., Mid-Atlantic Ridge) leads to ...**

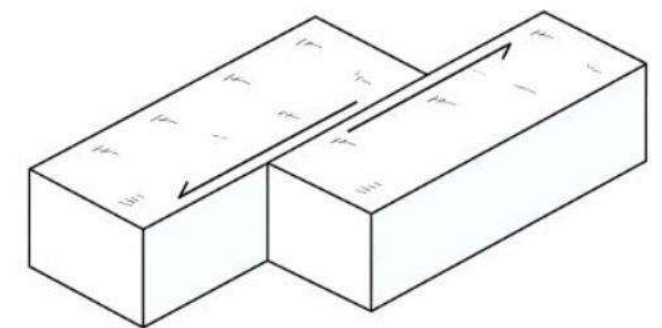
- a. ☐ the disappearance of ancient seas
- b. ☐ the formation of continental volcanic ranges
- c. ☐ increased thickness of the continental crust
- d. ☐ the formation of a new ocean floor

53. **The famous "San Andreas Fault" is an example of which plate movement?.....**

- a. ☐ Continental Convergence
- b. ☐ Oceanic Divergence
- c. ☐ Transform (Sliding) movement
- d. ☐ Destructive

54. **Which of the following results from the movement of the tectonic plates shown in the opposite figure?.....**

- a. ☐ The Red Sea
- b. ☐ The Mediterranean Sea
- c. ☐ San Andreas fault
- d. ☐ Andes mountains

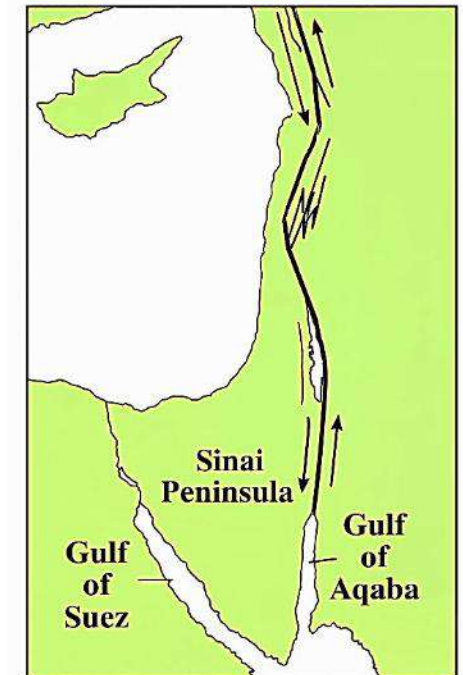


55. Which of the following illustrates the relationship between rock properties and occurrence of earthquakes?..
- a. ☐ Harder rocks release seismic energy quickly
 - b. ☐ Brittle rocks break when energy accumulates along weak faults
 - c. ☐ Silica-rich rocks prevent earthquakes
 - d. ☐ Carbonate rocks reduce the strength of waves

56. The opposite map shows Sinai Peninsula

The tectonic movement indicated by the arrows on the map is.....movement

- a. ☐ divergent
- b. ☐ transform
- c. ☐ convergent
- d. ☐ collisional



57. Which of the following industrial applications demonstrates harnessing lithosphere's properties?.....
- a. ☐ Using limestone in the cement industry
 - b. ☐ Formation of organic Carbon in plants
 - c. ☐ Increasing wind speed on mountains
 - d. ☐ Absorbing Ozone in the atmosphere

Second : Essay questions :

Explain why?

1. Silicate rocks (such as quartz) are considered more resistant to weathering than limestone?

.....

.....

2. Rocks that are composed of Carbonate salts, such as limestone, develop more caves and cavities than rocks composed of Silica?

.....

.....

حمل الآن

مجاناً وحصرياً

المراجعة رقم (4)

اختبار شهر ابريل



April Revision

answer of unit 3 lesson 4,5 & unit 4 lesson 1

lesson 4 Sensation and Response and Their Role in the Interaction of Living Organisms with the Biosphere

Lesson 4 Assessment four Assessment

First: Multiple Choice Questions

First: Multiple Choice Questions Choose the correct answer:

1. The nerve cell is considered the fundamental unit in the formation of the nervous system, and its basic function is:

- A) Hormone production
- B) Nerve impulse transmission
- C) Energy storage
- D) Body defense

2. The period during which a new nerve impulse cannot be generated is called:

- A) Depolarization
- B) Repolarization
- C) Refractory period
- D) Resting potential

3. Which of the following statements explains why the Sodium-Potassium pump requires energy?

- A) Because it moves ions down the concentration gradient
- B) Because it moves ions against the concentration gradient
- C) Because it does not depend on ATP
- D) Because it only works during sleep

4. During depolarization, the membrane potential:

- A) Stays constant at -70 mV
- B) Becomes more negative
- C) Changes from negative to positive
- D) Does not change

5. During repolarization, what happens?

- A) Sodium ions enter the cell
- B) Potassium ions exit the cell
- C) The sodium-potassium pump stops
- D) The positive potential inside the cell increases

6. What is the main function of neurotransmitters in the synapse?

- A) Storing energy
- B) Transmitting the signal between two cells
- C) Breaking down ions
- D) Increasing axon speed

7. Which of the following occurs immediately after the nerve impulse reaches the terminal knobs (buttons)?

- A) Calcium exits the cell
- B) Calcium enters and vesicles fuse with the membrane**
- C) Sodium channels close
- D) Neurotransmitter breakdown

8. The enzyme Cholinesterase acts to:

- A) Stimulate depolarization
- B) Rebuild vesicles
- C) Break down Acetylcholine after it performs its role**
- D) Increase membrane permeability

9. What explains the importance of the resting potential in a nerve cell?

- A) It prevents the cell from responding
- B) It keeps the membrane ready to transmit the impulse when a stimulus occurs**
- C) It increases the number of synapses
- D) It decreases the membrane permeability to water

10. The Purkinje cell, which can receive hundreds of thousands of synapses, demonstrates that:

- A) The nervous system is slow to respond
- B) Nerve cells function independently
- C) The nervous system is an interconnected network that transmits information quickly and accurately**
- D) Synapses are few in the brain

Second: Essay Questions

Explain why?

- 1. The Sodium-Potassium pump is essential for maintaining the resting potential in nerve cells.**

Sodium-Potassium Pump: It maintains the unequal distribution of ions

(3 Na⁺ out / 2 K⁺ in) required to keep the membrane "charged" at resting potential.

- 2. Hyperpolarization occurs immediately after repolarization.**

Hyperpolarization: Occurs because potassium channels are slow to close, allowing extra positive K^+ ions to leak out past the resting level.

3. The presence of a synaptic cleft between two nerve cells is essential despite its extremely small size.

Synaptic Cleft: It ensures the signal travels in only one direction and allows for the chemical regulation (filtering) of the nerve impulse.

4. The nervous system operates at a speed that exceeds the hormonal system.

System Speed: The nervous system uses rapid electrical impulses (up to 120 m/s), while the hormonal system relies on slow blood circulation.

5. Inhibiting the Sodium-Potassium pump by the toxin Ouabain leads to the cessation of nervous system function.

Ouabain Toxin: It stops the pump, preventing the neuron from resetting its ion balance. Without this "recharge," the neuron can no longer fire or transmit signals.

Unit 3 lesson 5 nanotechnology

First: Multiple Choice Questions

1. The properties of matter change at the nanoscale compared to its properties in the normal state due to:

- A) Decrease in mass.
- B) Increase in the ratio of surface area to volume.
- C) Change in the composition of atoms.
- D) Decrease in the temperature of matter.

2. When the size of gold is reduced to the nanoscale, its color changes because:

- A) The number of electrons in its atoms decreases.
- B) Its interaction with light changes.
- C) Its density increases.
- D) It loses its metallic properties.

3. The hardness of copper increases at the nanoscale as a result of:

- A) Increase in the number of electrons in its atoms.
- B) Convergence of molecules.
- C) Increase in the ratio of surface area to volume.
- D) Increase in the energy of the nucleus in its atoms.

4. Carbon Nanotubes are used in electronics because they are:

- A) Insulators of electricity.

B) Conductors of electricity more than copper.

C) Decomposed quickly.

D) Soluble in water.

5. Buckyballs are useful in medicine because they:

A) Are resistant to heat.

B) Contain rare minerals.

C) Can carry drugs inside them.

D) Absorb light.

6. The function of biofuel cells is similar to the process of cellular respiration in that both:

A) Produce energy from the oxidation of glucose.

B) Consume ATP molecules.

C) Store energy.

D) Depend in their function on solar energy.

7. Nanoparticles are used in biofuel cells because they:

A. Reduce the rate of reactions.

B) Increase the rate of transfer of electrons.

C) Prevent the oxidation of reactants.

D) Invalidate the function of enzymes.

8. In drug delivery using nanotechnology, nanoparticles help to:

A) Spread the drug throughout the whole body.

B) Increase the drug dosage.

C) Deliver the drug directly to the infected cells.

D) Prevent its absorption.

9. When matter is fragmented, the relationship between surface area and volume shows that:

A) The volume decreases and the surface area increases.

B) Both the volume and surface area decrease.

C) The volume decreases and the surface area does not change.

D) Neither the volume nor the surface area is affected.

10. Nanotechnology contributes to biosphere sustainability because it:

A) Relies on polluting materials.

B) Reduces the consumption of energy and resources.

C) Produces toxic waste

D) Uses fossil fuel.

Explain why?

1. Materials exhibit new properties at the nanoscale: At this scale, the **surface-area-to-volume ratio** becomes extremely high, and **quantum effects** begin to dominate. This changes how electrons behave, altering the material's color, hardness, and chemical reactivity.

2. Biofuel cells are considered a biological application of clean energy: They use enzymes or biological catalysts to convert **chemical energy from organic matter (like glucose)** directly into electricity. They are "clean" because they often produce minimal waste and can use renewable biological sources.

3. The rate of chemical reactions increase in nanoparticles: Because the **active surface area is much larger** relative to the volume, there are far more sites available for reactants to collide and bond simultaneously, which drastically accelerates the reaction speed.

4. Carbon Nanotubes are used in the design of future space elevators: They possess an extraordinary **strength-to-weight ratio**. They are hundreds of times stronger than steel but significantly lighter, making them one of the few materials theoretically capable of supporting a cable extending into orbit.

5. Nanotechnology is a bridge between biology, physics, and chemistry: It uses **Physics** to understand atomic forces and light, **Chemistry** to synthesize new molecular structures, and **Biology** to apply these tools to medicine (like drug delivery) or environmental protection, creating a unified approach to sustainability.

Unit 4 lesson 1 lithosphere

Unit 4 Lesson 1 Assessment one

Choose the correct answer:

1. Which of the following factors most significantly affects the weathering rate of Carbonate rocks?

A) High rock density

B) High water salinity

C) High concentration of CO₂ in rainwater

D) High air temperature

2. If an area is found to contain thin layers of limestone with cavities and caves, this indicates that:

A) The limestone has high hardness

B) The limestone has undergone chemical weathering

C) The soil in this area is poor in minerals

D) The solubility of limestone in water is low

3. When two convergent tectonic plates move toward each other, the most likely result is:

A) Formation of new marine valleys

B) Uplift of rocks formation of mountain ranges

C) Widespread volcanic lava over vast areas

D) Decrease in the concentration of minerals in the soil

4. Which of the following elements is primarily released from rocks due to weathering process and is used directly in building plant biomolecules?

- A) Iron **B) Potassium** C) Aluminum D) Silica

5. Porous volcanic rocks are used in some water treatment plants because they:

- A) Increase the viscosity of water
B) Absorb impurities and heavy metals
C) Prevent water from passing to lithosphere depths
D) Convert water into carbonic acid

6. Which of the following illustrates the relationship between rock properties and the occurrence of earthquakes?

- A) Harder rocks release seismic energy quickly
B) Brittle rocks break when energy accumulates along weak faults
C) Silica-rich rocks prevent earthquakes
D) Carbonate rocks reduce the strength of waves

7. The role of the lithosphere in the biosphere includes:

- A) Providing oxygen directly to plants
B) Producing minerals necessary for plant growth
C) Increasing the proportion of Carbon dioxide in the atmosphere
D) Preventing water from leaking into the soil

8. Which of the following industrial applications demonstrates harnessing lithosphere's properties?

- A) Using limestone in the cement industry**
B) Formation of organic Carbon in plants
C) Increasing wind speed on mountains
D) Absorbing Ozone in the atmosphere

Explain why?

1. Rocks that are composed of Carbonate salts, such as limestone, develop more caves and cavities than rocks composed of Silica.

Carbonate rocks like limestone are highly reactive to acidic rainwater (CO_2 dissolved in water). This chemical reaction dissolves the rock over time, forming large voids. Silica-based rocks (like quartz) are chemically stable and much more resistant to acid, preventing cave formation.

2. Chemical weathering of rocks plays a role in supplying plants with the minerals necessary for their growth.

Chemical weathering breaks down the crystalline structure of minerals within rocks. This process transforms solid minerals into soluble ions (like Potassium, Calcium, and Magnesium) that dissolve into soil water, making them accessible for plant roots to absorb.

3. Mountain ranges appear in areas of Tectonic plate collision, whereas they do not appear in areas of plate divergence.

Tectonic collision creates intense horizontal pressure that squeezes and folds the crust upward, building high mountain ranges. In divergence areas, the plates pull apart; this creates tension that thins the crust and forms valleys or mid-ocean ridges rather than high mountains.

4. Using porous rocks, such as zeolite, in water purification instead of industrial chemicals

Bec they absorb impurities' & heavy metals & they used instead of chemicals.

كيفية طباعة صفحات معينة من ملف معين

مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9

